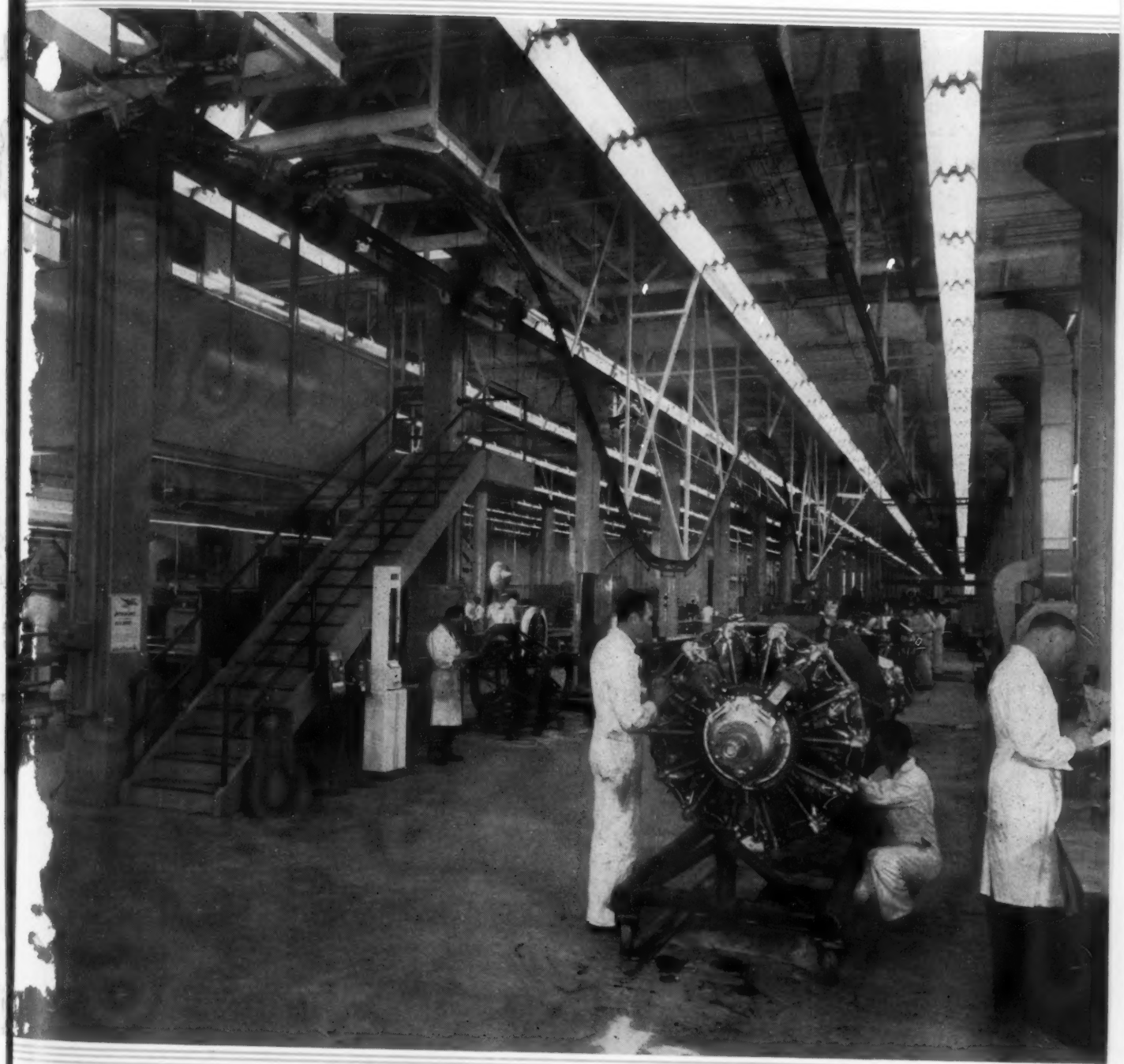
ELECTRICAL WEST

September 1948
25 cents



Light in Action, Page 85
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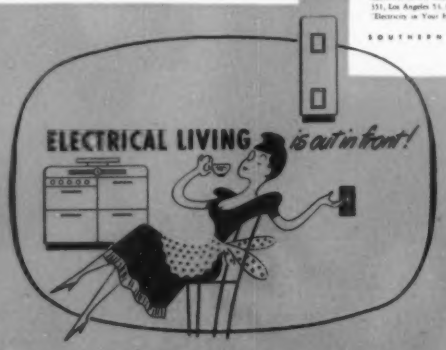
KESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

my electric water heater is
a Constant Comfort!
JUST COUNTING MY BLESSINGS since we installed an electric water heater. Because it's electric it's as clean, safe and dependable as our electric lights. Absolutely accurate controls guarantee plenty of water that's always hot, but never too hot. No flue is necessary, so our water heater can be located anywhere. It's automatic and efficient, so it's cheap to operate.
Your dealer has new electric water heaters. See them now—you'll be money and comfort ahead.
ELECTRIC WATER HEATING IS ANOTHER REASON ELECTRICAL LIVING is out in front!
SOUTHERN CALIFORNIA EDISON COMPANY

Electric Cooking is Switch-ery... no less!
DINNER IS READY, right on time—and deliciously cooked to a "just-the-way-your-family-likes-it" turn. So you can bow graciously and let them sing your praises. By the way, you needn't mention the fact that you prepared it early in the morning, had the day to yourself, and whisked it from oven to table just a short time ago. Let that be a secret between you and the helper which did the rest exactly to your order—your electric range!
ELECTRIC COOKING IS ANOTHER REASON
INVESTIGATE ELECTRICAL LIVING. Call your Edison office for advice on Adequate Wiring. Or write to Southern California Edison Company, P. O. Box 351, Los Angeles 53, for a free copy of "Electricity in Your Home Plans."
SOUTHERN CALIFORNIA EDISON COMPANY

my electric home freezer is
a Season-Stretcher!
Fresh fruits and vegetables all year 'round—a treat for the family—and a cinch for me, since we bought an electric home freezer. It keeps food for serving at just-right freshness, at the peak of flavor and healthful goodness. Without a moment's worry, too—our home freezer is electric, so of course it is perfectly dependable. Not only that, it helps to stretch the dollars on our food budget—lets me buy when prices are right.
Electric home freezers are available now with many new and attractive features. See them at your dealers.
ELECTRIC FREEZING IS ANOTHER REASON ELECTRICAL LIVING is out in front!
SOUTHERN CALIFORNIA EDISON COMPANY



SUM AND SUBSTANCE

"Electrical Living is out in front!" is a clever and inviting slogan now widely used to promote electrical appliance sales. But it isn't that easy. You know, and so do we, that appliances are not sold on slogans alone.

Translating those words into very real pictures is the job of a current series of Edison advertisements. Each deals with a single appliance, points out its advantages in brief and simple terms, adds *another reason* to a growing list which gives meaning to the slogan.

Directly identified with each advertisement, to give it sum as well as substance, the phrase "at your dealers" is typical of Edison cooperation with electrical appliance dealers of Southern and Central California. It means more sales, more profits for you.

SOUTHERN CALIFORNIA EDISON COMPANY

WE BAKED BUTYL FOR 4800 HOURS

TO CREATE A BETTER WATTHOUR METER

H. E. TREKELL
Designing Engineer
Meter Engineering Division
West Lynn, Massachusetts

type I-50 COMBINES ACCURACY WITH LOW MAINTENANCE COSTS

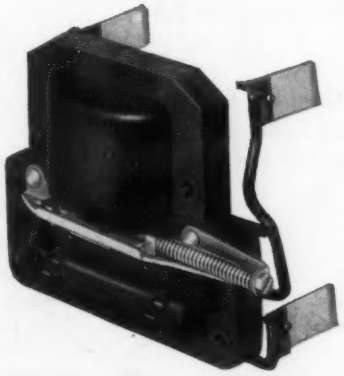
For over 4800 hours, or nearly 7 months, we aged some butyl rubber in a 121° C air oven. At the end of that time it was still flexible and rubbery, in contrast to other heat-resistant rubber compounds which had failed, become brittle, after three weeks or less.

Then we took some polyethylene insulation material and tested it for aging, for thermal cycling between 95° C and −40° C, for heat, weathering, for ultraviolet light, and for humidity.

From these tests and others came the electromagnet of the new I-50 watthour meter. It has a polyethylene-insulated potential coil with improved insulation level, improved stability, and longer life. And it has a new molded-butyl-rubber current coil with temperature rise reduced from 55° C to 35° C, coils held firmly in place, resistance to heat and cold, and long life.

The design of the I-50 coils provides for a minimum flashover of more than 7000 volts. Even considerably higher voltage will not cause a breakdown through the insulation. That is just one of the reasons why we call the I-50 the first completely new meter in fifty years.

Harold E. Trekell



Typical of the engineering achievements in the I-50 is the new electromagnet with its butyl rubber molded current coil, polyethylene potential coil, its light load adjustment and factory-set lag compensator built in as integral parts, and its brazed terminal connections. Calibration stability, corrosion resistance, long life, and better insulation levels are some of the advantages of this new construction.

No other meter has ever combined so many desirable features.

Bearing maintenance, high-pressure end bearings, and all bearing lubrication have been eliminated by **MAGNETIC SUSPENSION OF THE MOVING ELEMENT.** Calibration stability has been assured by DAMPING MAGNETS DIE CAST IN POSITION. Corrosion has been minimized by **ONE-PIECE MOLDED "S" BASE.** Reading has been made easier by **SIMPLIFIED REGISTERS.** Accuracy, long life and low maintenance costs are assured by the **SIMPLICITY OF THE UNIT CONSTRUCTION.**

For the time being production of the I-50 will supplement that of our regular I-30 meter. This will result in a production increase of about 15% for 1948. Your nearest G-E representative has more details. Bulletin GEA-5050 describes the I-50 more fully. Write for your copy today. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

001-28

SEPTEMBER 1948

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal", "Journal of Electricity, Power and Gas" and "Journal of Electricity". Contents Copyright. Sixty-first year of publication.

ELECTRICAL WEST

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INDUSTRY GROWS

That industry is moving West was well described in the August issue. In the annual Industrial Electrification number, in October, the particulars of this Western industrial development will be presented in more specific examples. In the steel industry, especially, some of the recent advances along this growth line will be described. The new tin plate mill at Pittsburg, Calif., is one such specific case. Electrical features at other steel plants in the West, in Seattle, Los Angeles and San Francisco, also will be included. To reveal the kind of service shop organization needed by a growing industrial community one exceptional shop will be shown. Similar items of industrial electrification importance will be found in October.

September will group a number of big electrical group meetings, such as the RMEL at Glenwood Springs, IAEI section meetings at Denver, Salt Lake City and Oakland; plans for the PCEA at Fresno; the San Diego Electrical Exposition. Significant ideas, thoughts, methods and techniques derived by trained observers from these meetings will be given in terse reviews. In addition there will be the regular features, Sales Guide, News Letter, industry news and new products.

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Cover: Continuous runs of fluorescent lighting units extend the full length of the 27-ft. aisles of the United Air Lines' maintenance base in San Francisco. Austin Co. photo.

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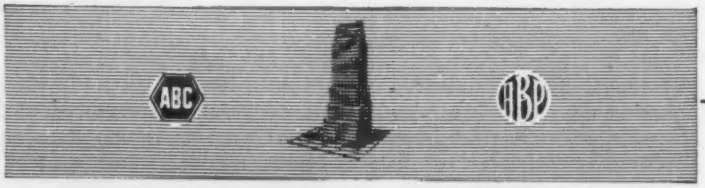
San Francisco (4) ... Tom Carmody, 68 Post St., DO. 2-4600



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NO. 3

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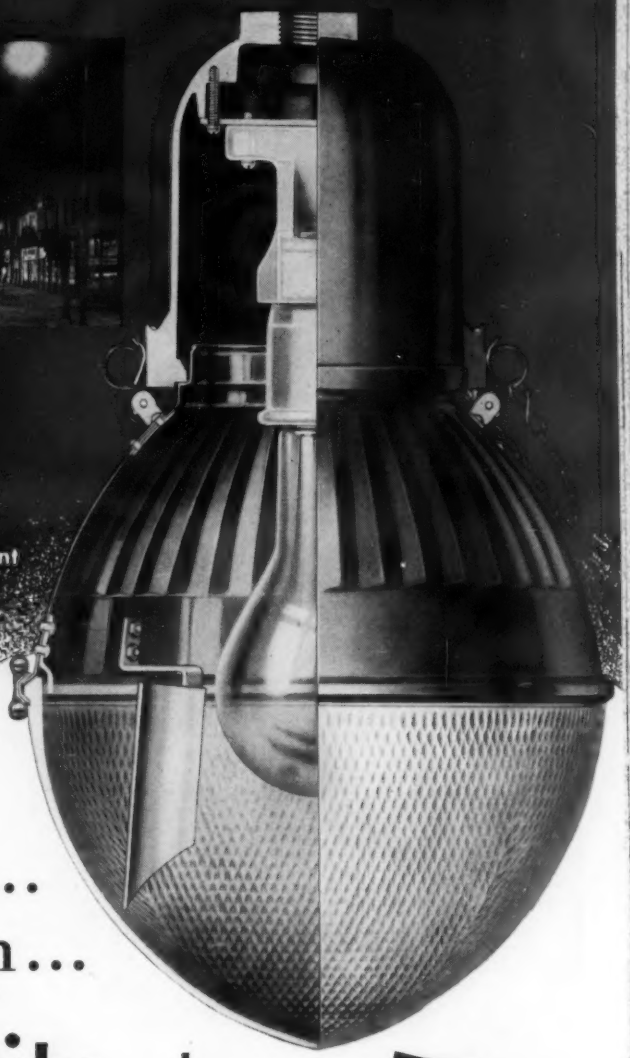
Progressive Towns Re-Light for Safety

These "before" and "after" photos show how one eastern city tripled the illumination with L-M Spherolites. Formerly, light on the pavement was .64 lumens per square foot; with Spherolites it is 1.8—and with the same size and number of lamps. Same total wattage—but more efficient utilization of light. And, says the superintendent, there is less breakage, less cleaning, and maintenance costs are substantially lower. Not bad!



Safety goes up... maintenance goes down... with L-M Spherolite

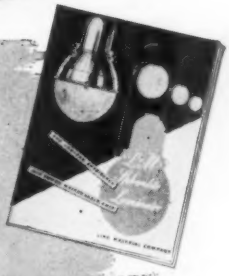
Spherolite luminaires direct a high percentage of the light onto the pavement, spreading the light over a wide area, in a controlled pattern. Here are some Spherolite features:

Versatility: adaptable to all mounting requirements; wide variety of metal hoods, porcelain heads, glassware, holders, deflectors.

Low Maintenance: dust and moisture seals between glass and reflector and hood; easily accessible for relamping. Hoods sealed against dust, moisture insects. L-M fluted reflector by-passes the light around vertical axis of lamp, avoiding heat concentration and assuring full lamp life.

Long life: weather-tight construction maintains reflector efficiency for many years; aluminum and other non-corrosive materials assure long life; heat-barrier hoods prevent cable deterioration.

Engineering Service: need help? ask for an L-M Street Lighting Engineer—trained, experienced men who help you get safe, efficient street lighting to fit your budget.

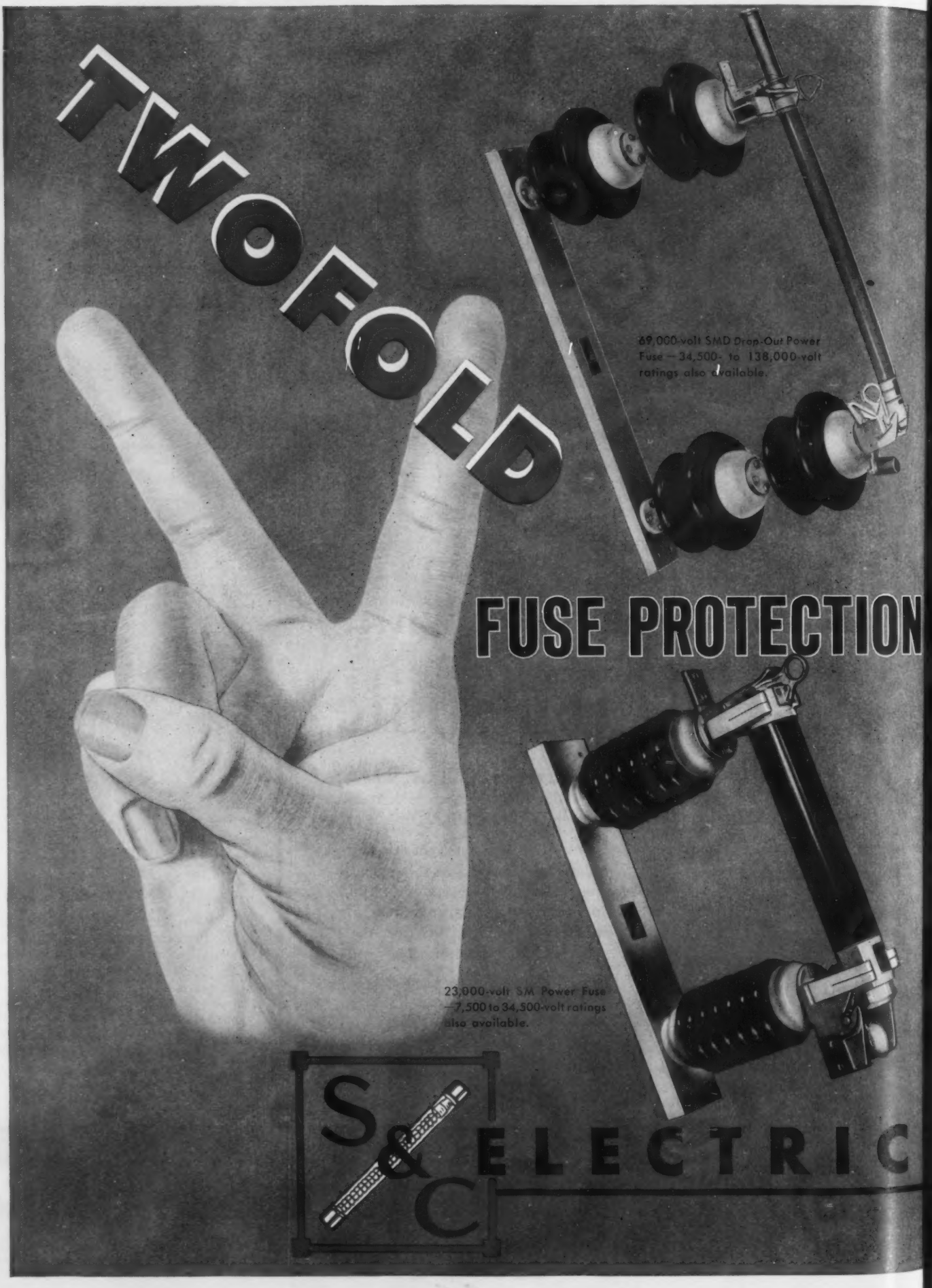


Want to Know More?

Write for L-M's new Spherolite bulletin. Photometric data, I.E.S. recommendations, and other useful information. Details on Spherolite construction and application, on hoods, glassware, standards, brackets, accessories, and control equipment including L-M "Wired Radio" control. Ask any L-M field engineer or **write Line Material Co., Milwaukee 1, Wisconsin.**

LINE MATERIAL Street Lighting

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers • Fuse Cutouts and Fuse Links • Lightning Arresters • Oil Switches • Pole Line Hardware • Line Construction Specialties • Underground Equipment • Fibre Conduit • Street and Airport Lighting Equipment • "Wired Radio" Control Equipment • Capacitors


TWOFOLD
FUSE PROTECTION
69,000-volt SMD Drop-Out Power Fuse — 34,500- to 138,000-volt ratings also available.
23,000-volt SM Power Fuse —7,500 to 34,500-volt ratings also available.
S&C
ELECTRIC

ESSENTIALLY, primary fuses are applied for primary protection, but... because no other make of fuses can provide it... the belief is too commonly entertained that secondary-fault protection has no part in primary fuse application. This is to miss an opportunity to take preventive measures against transformer burnouts in case of faults at the secondary terminals and in case of failure of secondary protective equipment to clear short circuits.

Actually this desirable twofold fuse protection can be secured because S & C's SM and SMD Power Fuses are designed for *full coverage**, and therefore include these notable features:

1. Positive means and ability to interrupt the lower values of primary current developing during secondary short circuits.

2. Definite means and ability to cope with the severe recovery voltage often accompanying the interruption of short circuits on the transformer secondary.

3. "Non-damageable" fusible element that precludes "sneak-outs", and therefore permits primary fusing with ampere ratings sufficiently close to the transformer load current to function on secondary short circuits; also provides permanently accurate time-current characteristics, so important in close coordination practice.

These are the particular essentials of fuse design and operation required to obtain secondary fault protection of the type described above to supplement the ordinary functions of a fuse on primary applications. When designing your own, or ordering factory-built substations, be sure to get this *twofold* fuse protection—specify SM or SMD Power Fuses.

A term adopted to call attention to the importance of considering **all the conditions under which a fuse may be called upon, or may have the ability, to operate dependably.*

COMPANY 4425 RAVENSWOOD AVENUE
CHICAGO 40. ILLINOIS, U.S.A.

Formerly SCHWEITZER & CONRAD, INC.

R. E. Cunningham & Son, Los Angeles; George E. Honn Co., San Francisco; Thos. S. Wood, Seattle

choose Leader

All Purpose SM-440 Luminaire

when you Plan on large quantities of LIGHT

This powerful lighting unit provides equalized and gentle brilliance. It diffuses abundant light over large areas and in all directions . . . LEADER SM-440 is a versatile fixture that's "just right" in many settings . . . accessible throughout and easy to maintain . . . durable . . . popular-priced.

LEADER SM-440

An all-metal fixture direct-indirect type. Has 35° and 25° shielding with metal louvers (other shielding angles also available). Louvers swing down for access or can be removed entirely.

Fixture is built for mounting individually or in continuous rows. Available in 2, 3 or 4—40 watt units, also 2—100 watt units. Also available in 2, 3 or 4—lamp slimline styles.

For Lighting
HOSPITALS
SCHOOLS, SHOPS
INSTITUTIONS
OFFICES

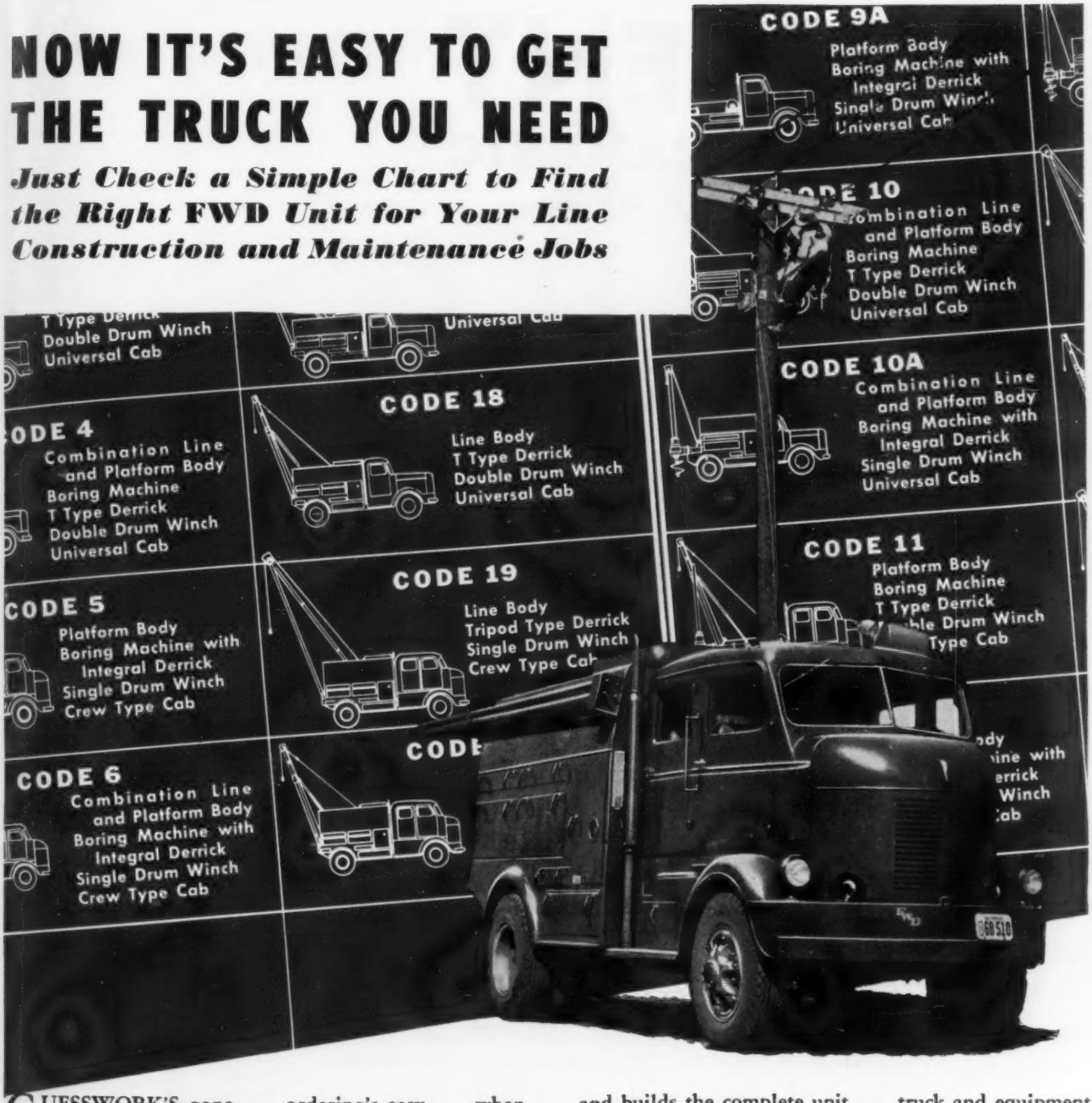
A STEP AHEAD LEADER ELECTRIC COMPANY

Sold and installed only by the better electrical wholesalers and contractors . . . Write us for details.

LEADER ELECTRIC COMPANY
3500 N. Kedzie Avenue • Chicago, Illinois

NOW IT'S EASY TO GET THE TRUCK YOU NEED

Just Check a Simple Chart to Find the Right FWD Unit for Your Line Construction and Maintenance Jobs



GUESSWORK'S gone . . . ordering's easy . . . when you use FWD's handy code chart to help you choose the FWD truck to fit your line construction and maintenance needs.

With this chart, you can quickly see the 38 varying — yet standardized — combinations that are available, and the specific equipment each truck carries. From this chart you can easily order the truck you want because each unit is designated by an individual code number. What's more, only one order is needed. FWD engineers and builds the complete unit . . . truck and equipment.

In FWD's complete series of 38 built-to-code trucks — developed in more than 25 years of close contact with the needs of utilities, you can be sure of finding the right unit for you.

For complete information and code chart, see your Graybar distributor or write —

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory: KITCHENER, ONTARIO

Built-to-Code

MOTORIZED UNITS

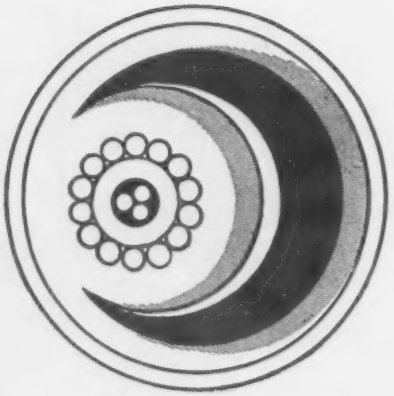
FOR LINE CONSTRUCTION AND MAINTENANCE

Built By

Makers of America's Foremost Heavy Duty Truck

Distributed by Graybar

CRESCENT
VARNISHED CAMBRIC POWER CABLE



Heavier loads for longer periods of time are possible with CRESCENT VARNISHED CAMBRIC CABLE. This general-purpose, industrial power cable provides higher current-carrying capacity for the same size of copper conductors, together with maximum safety and permanence.

Available with weatherproof braid cover for dry locations, with a lead sheath for wet locations, or with a steel tape parkway armor construction (Type VCLJFJ) for burial in the earth without additional protection.

CRESCENT
WIRE & CABLE

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

hydroelectric

workhorse

The "workhorse" of California's newest hydroelectric power plant, Electra, is another Pelton Water Wheel Company installation. The double overhung impulse turbine illustrated is rated at 37,500 hp at 225 rpm with an operating head of 1,223 feet, and the generator 33,000 kva. It is one of three similar units installed at the new Electra Plant of the Pacific Gas & Electric Co.

One of the oldest hydroelectric plants in California (1902), the original Electra Plant was equipped with Pelton Water Wheels. Then, as now, Pelton leadership in the design and construction of impulse turbines helped pioneer the ever widening field of hydroelectric development. Pelton hydraulic turbine installations ordered since V-J Day will produce nearly 1,000,000 hp for industrial use.

BLW THE BALDWIN GROUP

The PELTON WATER WHEEL Company

A Subsidiary of the Baldwin Locomotive Works

2929 NINETEENTH STREET • SAN FRANCISCO 10, CALIFORNIA

why it will pay you to specify

STANDARDIZED NETWORK EQUIPMENT

The a-c secondary network system is recognized as *the* lowest-cost system for providing high-quality service to heavy load areas. It is normally the most economical high-quality service system for business sections of cities—50,000 or more in population—and will frequently pay its way in smaller towns as well.

But—to realize the full savings possible with networks, you *must use standardized* network equipment.

FASTER DELIVERY. Invariably, G-E standardized network transformers and protectors can be supplied on shorter delivery. No special engineering is required—production facilities are set up to manufacture standardized units.

LOWER PRICE. G-E standardized network units are normally appreciably lower in price than non-standard designs.

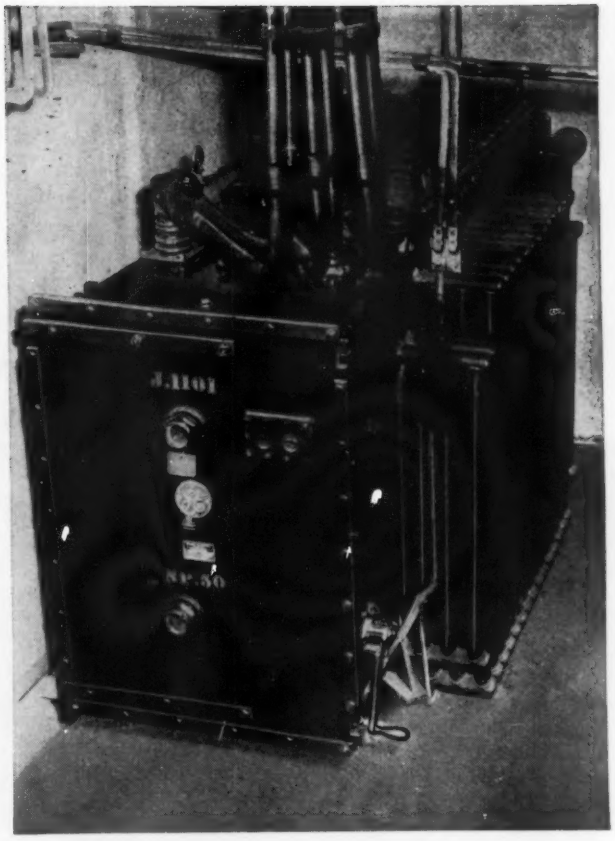
SUBSTANTIALLY LOWER INSTALLATION COSTS. G-E standardized network transformers and protectors are designed for a long, narrow vault. In length, width, overall height—and particularly in location of cable entrances, accessories, valve and filter-press connections—standardized equipments are of the most economical design from the standpoint of vault construction and installation costs.

SAVINGS IN MAINTENANCE. G-E standardized network equipment incorporates all the maintenance-saving developments which the industry recognizes as desirable. Transformer cover and switchbox are welded, not bolted, to the transformer—the tap changer is located behind a pipe plug. Thus major gaskets are not needed. Transformer accessories are grouped in one location for maximum convenience.

An inquiry to your G-E Representative or a letter to *Apparatus Department, General Electric Company, Schenectady 5, N.Y.*, will bring you information on standardized network equipment—and just what should be specified to secure the savings which this equipment makes possible. Bulletin GEA-5024 describes network transformers; GEA-2017, network protectors.

ALL THE FEATURES YOU NEED . . . NO COSTLY EXTRAS

G-E standardized transformers and protectors include all accessories, all features, that the majority of users of network equipment have found desirable.

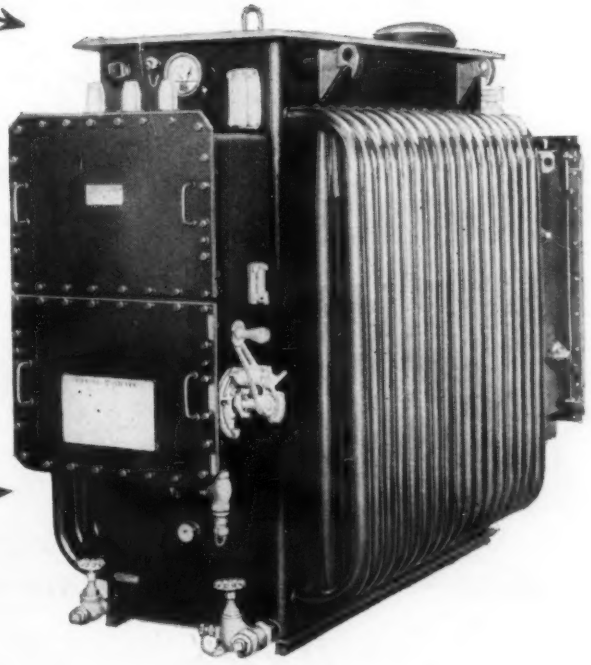


TOP CONNECTIONS OF TERMINALS, for both high- and low-voltage cables, are well below top of transformer, allowing room for larger radius bends of cables in shallower vaults. Maximum interchangeability between various sizes is also provided.

THE PHYSICAL SIZE AND ARRANGEMENT of G-E standardized network equipments mean minimum vault construction costs. These equipments are designed for vaults with widths of 4½ feet or less—vaults which can generally be built between building line and curb, and which reduce appreciably the problem of roof-slab construction.

AUTOMATIC SYSTEM PROTECTION is provided by the network protector which trips on reversal of power. When conditions are corrected, it recloses automatically. Protector case is submersible. With the door open, the protector unit can be slid out on rails for ready inspection. Dust-tight relays can be easily removed and replaced for checking.

MAJOR TRANSFORMER GASKETS ARE ELIMINATED by welding, not bolting, transformer cover and switchbox to the main unit. Locating tap changer behind a pipe plug eliminates a packing gland around an external shaft.



ALL TRANSFORMER ACCESSORIES—liquid-level gages, thermometer, pressure test valves, tap changer, drain valves, sampling valves and filter-press valves—are located at the high-voltage end of the transformer where they are readily accessible. Bushings themselves can be removed externally, without opening the main transformer tank.

THE HIGH-VOLTAGE SWITCH is a three-position disconnecting and grounding switch with electrical interlock to prevent operation when the transformer is energized either from the high-voltage or low-voltage side.

COOLING TUBES may have a wall thickness of 3/32 inch (vault-type) or of 5/16 inch (subway type). This is the only difference between the vault-type and subway-type transformers. The tank casing is made of a 5/16-inch plate. Both types—designed to withstand a full 7-pounds-per-square-inch, 24-hour pressure test—can be completely submerged without damage or interruption of service. Both types are protected by a superior G-E painting system, developed specifically for severe underground service.

GENERAL ELECTRIC

IT'S *in the* BAG

A POSITIVE CORROSION-PROOF *Splice*

Reliable Straightline Splices are now loaded with a neutral, all weather temperature grease which seals joints against corrosion.

A tighter grip — important at very light sag tensions — results from this lubrication.

To exclude dirt and grit, the splices are individually packed and sealed in sturdy plastic envelopes.

Reliable ELECTRIC COMPANY
3145 CARROLL AVENUE CHICAGO 12

OVER 40 YEARS Service TO THE UTILITIES

17-39% Lighter

UP TO 1/3 SMALLER — FOR EASIER HANDLING AND INSTALLATION

A Good Allis-Chalmers Distribution Transformer Made Even Better!

EASIER HANDLING and installation plus better appearance result from the reduction in weight and dimensions of these *improved* distribution transformers. And they were made without any sacrifice in operating characteristics, or mechanical strength. Most of these savings result from use of new preferred oriented electrical core steel.

Compare our improved units with the old type. You'll find the same strong welded construction . . . corrosion resistant finish . . . careful workmanship . . . and all the other features that mean long attention-free service on the line. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2403

STANDARDIZED DESIGNS

Built to meet EEI-NEMA Standards
(*Preferred types)

kva	4800 volts and below	7200 volts and up
1½-25	*PBSR	*CBSR or PBSR
37½-100	*PBS	*CBS

KEY TO TYPE DESIGNATION

PBSR—High voltage pocket bushings with low voltage stud bushings in tank wall . . . round tank.

PBS—High voltage pocket bushing with low voltage bushings in tank wall . . . semi-elliptical tank.

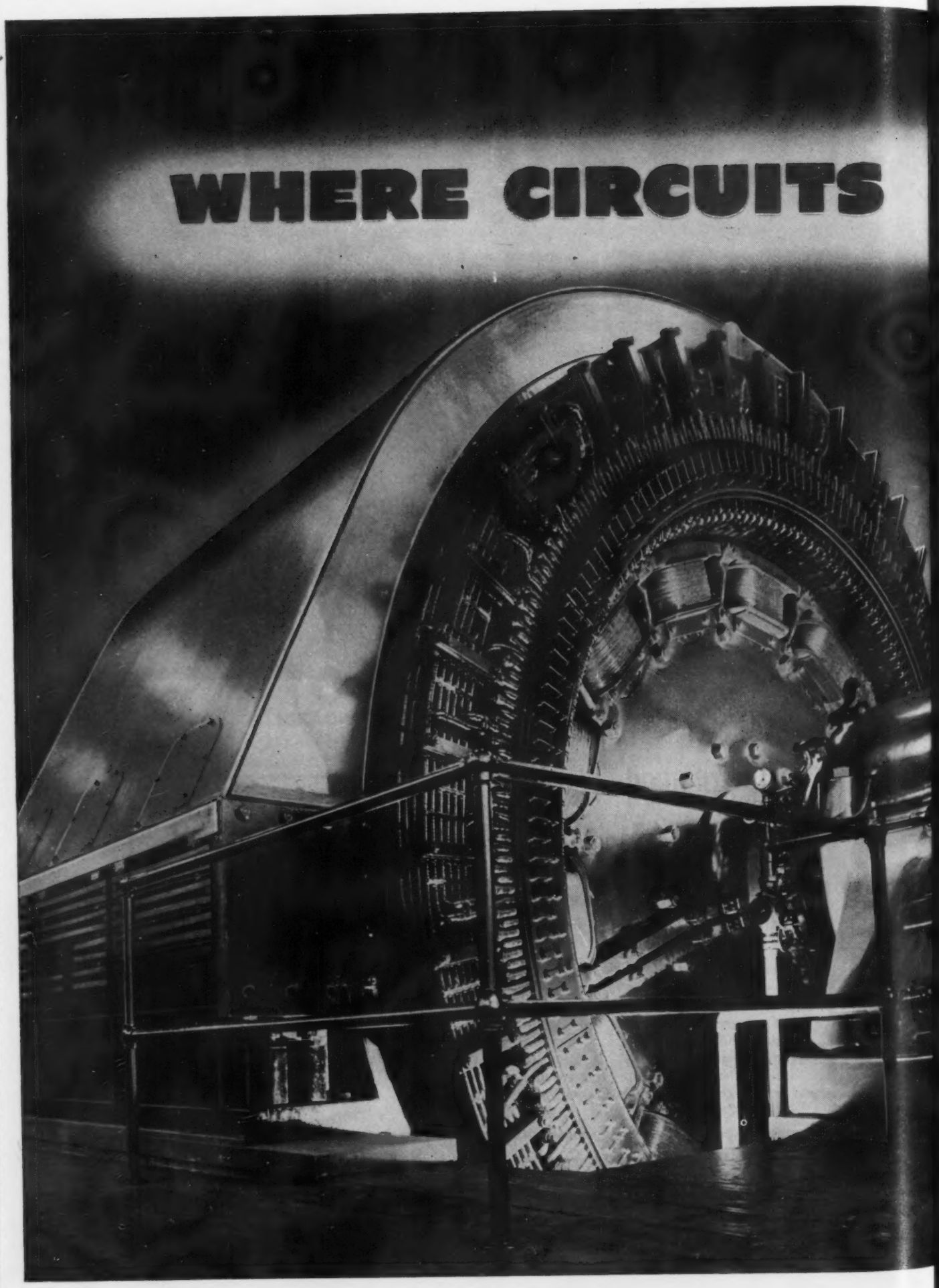
CBSR—High voltage cover bushings with low voltage stud bushings in tank wall . . . round tank.

CBS — High voltage cover bushings with low voltage stud bushings in tank wall . . . semi-elliptical tank.

SEND FOR BULLETIN 61B6159B on distribution transformers — 1½ to 100 kva, 2400 — 15,000 v.

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment From Generation Through Utilization


WHERE CIRCUITS

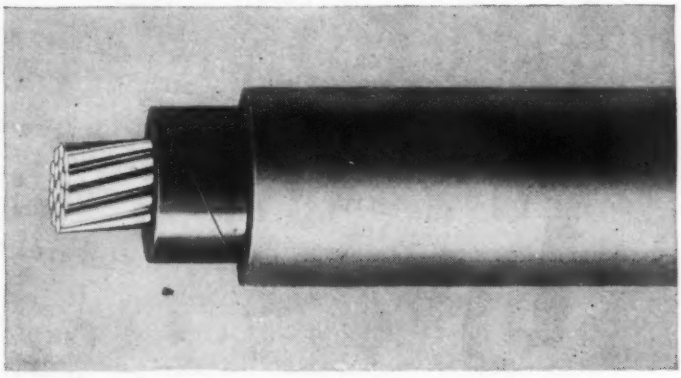
RUN A FEVER . . .

FOR HIGH OPERATING TEMPERATURES in power, heat and lighting circuits, Roebling Varnished Cambric Cable gives you heat-resistant insulation far and away superior to rubber. There's no better specification for generator and motor leads . . . it's proved an outstanding performer on leads for transformer and oil switches.

Roebling Varnished Cambric Cable is made in single and multiple conductor types . . . single, in sizes from 2,000,000 C.M. to No. 14 A. W. G. Both constructions are recommended for use up to 17,000 volts between phases . . . 26,000 volts for single conductor grounded neutral. The cable is given a lead sheath for service where moisture is encountered and for underground installation. Other types of outer coverings are often supplied to adapt the cable for special conditions.

Like all Roebling electrical wire and cable, Varnished Cambric Insulated Cable is a combination of the finest materials and of Roebling engineering, experience and production skill . . . your assurance of superior, lasting service. Write for Catalog J-900 and for any detailed information you may require, or communicate with your nearby Roebling distributor—he'll be glad to help you.

JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland



★ WIRE ROPE AND STRAND ★ FITTINGS ★ SLINGS ★ SUSPENSION BRIDGES AND CABLES ★ AIRCORD, AIRCORD TERMINALS AND AIR CONTROLS ★ AERIAL WIRE ROPE SYSTEMS ★ ELECTRICAL WIRE AND CABLE ★ SKI LIFTS ★ HARD, ANNEALED OR TEMPERED HIGH AND LOW CARBON FINE AND SPECIALTY WIRE, FLAT WIRE, COLD ROLLED STRIP AND COLD ROLLED SPRING STEEL ★ SCREEN, HARDWARE AND INDUSTRIAL WIRE CLOTH ★ LAWN MOWERS

ROEBLING

A CENTURY OF CONFIDENCE

JAR ROEBLING

UNION PACIFIC

The Governor of Nebraska invites You

VAL PETERSON
GOVERNOR

STATE of NEBRASKA
EXECUTIVE OFFICE
LINCOLN

To American Industry:

In the last decade, Nebraska's productive capacity has grown threefold. Modern industry has found in increasing numbers that Nebraska's diversified assets form the economic cornerstone of a better tomorrow!

Here there is respect and reward for individual initiative, whether its hallmark be overalls or a business suit. Nebraskans prize ingenuity, cooperation and achievement. Their fundamental faith is reflected by Nebraska government in a conscientious resolve against debt, restrictive taxes and regulatory legislation.

In behalf of all citizens, I invite industry to share Nebraska's unique heritage as the continental crossroads of commerce and heart of a land unmatched in natural wealth.

Sincerely,

Governor

Val Peterson

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

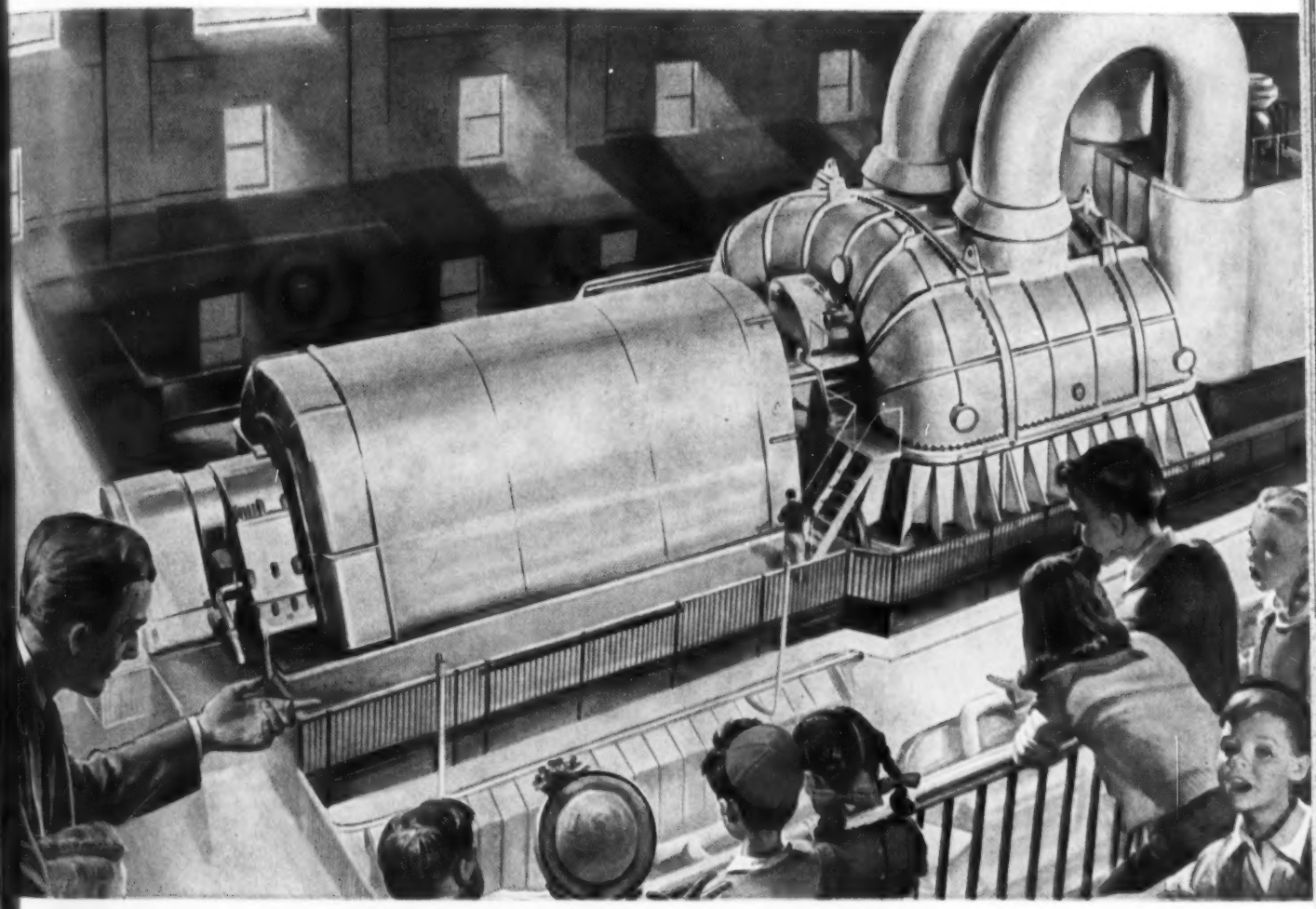
Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

YOU CAN BE SURE..IF IT'S Westinghouse



THE MOST EXCITING SCENE IN AMERICA

Your children are really seeing things. Look at this modern turbine-electric generator through their eyes.

There it lies, a giant of copper and steel. Nothing seems to move. Yet a quiet purr whispers that the energy of five million men is being sent out through far-flung networks of wires to do the work of America.

Electricity makes America tick. Electricity comes from giant turbine-generators like this. And a large share of America's turbine-generators comes from Westinghouse.

That is evidence of the confidence the electrical industry places in the products and services of Westinghouse.

It is an example worth following for engineer or layman, purchasing agent or housewife.

MAKER OF THE BROADEST LINE OF ELECTRICAL EQUIPMENT

Ratings: 5 to 50 amperes—15,000 volts; interrupting capacity, 150-1200 amperes; single-pole; single-throw; outdoor.

faulted rural lines get . . . "Split Second" clearance with the new GR RECLOSER

OPENS AND RECLOSES FAST ON TRANSIENT FAULTS TO ELIMINATE COSTLY SERVICE TRIPS . . .

Transient line faults—the type caused by lightning or falling branches—get "split second" clearance with the new GR Recloser when it is set for two instantaneous, followed by two time-lag, tripping operations.

The instantaneous opening snuffs out flashovers, without blowing series fuses—and 12-cycle reclosing restores service immediately. Thus, 80% of all outages are eliminated.

In case of permanent trouble—line down, heavy limb across line, etc.—the GR locks out after three attempts to restore service. If the recloser is co-ordinated with a series fuse, the fuse link will blow on time-lag opening, and cut off service on only the faulted portion of the line.

Another feature of the GR Recloser is its ability to pick up the line after lockout. The recloser automatically sets for time-lag tripping after lockout, and will ride through the inrush current period without the use of auxiliary devices.

For complete details, call your local Westinghouse office or distributor. Ask for B-3906. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60650

GR RECLOSER FEATURES

Selection in the field of 2 fast and 2 time-delay openings or all time-delay openings.

Dead tank—Dead Operating Handle.

Time-delay tripping on reclosing after lockout—rides through inrush.

Direct Drive mechanical lockout—no pumps—no latches—no clockwork.

Self-protected—no coil burnouts from overload or lightning.

—PROVIDE THESE ADVANTAGES:

- Positive co-ordination of reclosers on time-delay operations.
- Co-ordination with fuses on 2 instantaneous and 2 time-delay openings.
- High-speed (12-cycle) reclosing after first fast opening.
- Line pickup after lockout without by-pass switch.
- Minimum of system miles affected by any fault.

Westinghouse GR RECLOSERS

Made in the WEST . . . for the WEST

FEDERAL

Cell-Ceil*

for EASIER INSTALLATION

Quicker SALES

The simple sturdy hanging mechanism for Cell-Ceil* makes installation easy for the contractor — gives the building owner quick results. It's easier to sell Cell-Ceil for quick completion of jobs can be assured.

Better PROFITS

Lighting profits now from wall to wall! Cell-Ceil installations, easier to sell, easier to install, will add real volume to your lighting sales. Unprecedented interest being displayed by building owners in this new all steel louvre unit prove it to be one of the major steps in the history of lighting. This aroused interest means real profits to you.

Cell-Ceil comes in harmonious decorator colors. It is made of Acme Galva-Bond Steel**, that offers protection against loss of color or corrosion. These Cell-Ceil sections cannot warp. They are lightweight sections, suspended from overhead, simplifying installation in new construction or remodeling. All sections match perfectly . . . give continuous one-piece look . . . hide ceiling pipes —sprinkler heads—ventilating ducts . . . yet provide easy access for relamping and cleaning.

Architects, designers, and building interests are being told about Cell-Ceil *every month* in:

Architectural Forum — Progressive Architecture
Architectural Record — Interiors

We suggest you mail in the coupon for our Cell-Ceil Technical Bulletin on installation techniques.

*Trade Mark applied for.
**T.R. Acme Steel Co.

FEDERAL ENTERPRISES, INC.
Formerly Federal Electric Company, Inc.
8700 SOUTH STATE STREET CHICAGO, ILL.

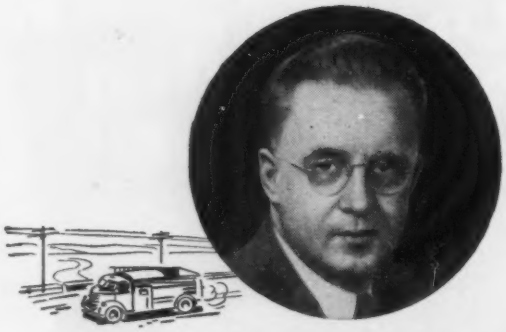
COUPON

Dept. CCT-4
Federal Enterprises, Inc.
8700 S. State St., Chicago 19, Ill.
Please send your Cell-Ceil Technical Bulletin on installation techniques.

NAME _____ POSITION _____
FIRM _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

BIGGER rural loads BETTER urban service with G-E 2-Way Radio

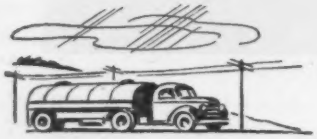
G-E mobile installation fits neatly into trunk of supervisor's cars. Note control panel below dashboard. Neat, rubber-covered handset wire coils compactly when not in use.



W. S. WILDER—Technical Assistant to Chief Electrical Engineer, Wisconsin Electric Power Company

"G-E radio gives us fast, dependable communication for critical maintenance work. This means better service for our customers at all times."

At G-E remote control console in headquarters, A. P. Schupmehl, Supervisor, sends out a call to cars.



Transmitter house and 260-foot FM antenna tower on hill near Milwaukee. High ground and lofty reach of this antenna gives station maximum range for the area. Transmitter is G-E FM 250-watt.

• The Wisconsin Electric Power Company serves Milwaukee and nearby cities. The company also distributes power through its feeder lines to hundreds of farms in the Dairy State. Today Wisconsin farmers are using more and more electricity daily for milking, separating and processing of dairy products.

To keep rural lines open, utility service trucks are on the alert at all hours. General Electric 2-way radio in these vehicles saves valuable time, permits dispatching to critical points instantly, easily, in any weather.

Electrical utilities throughout the United States and Canada put their confidence in G-E communication equipment.

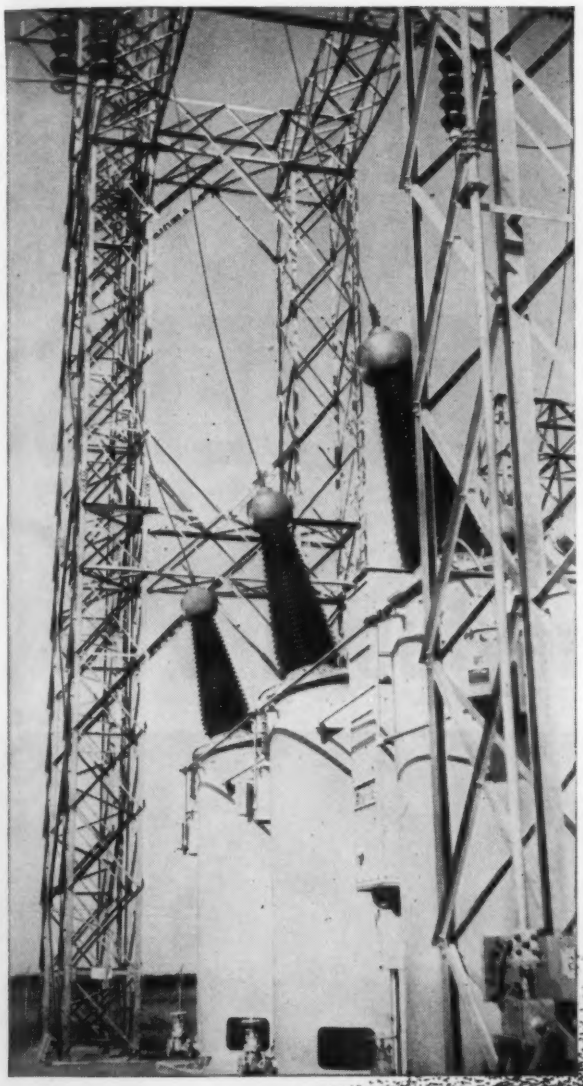
General Electric will provide a complete radio system to fit your requirements—to help you give best service to your utility customers.

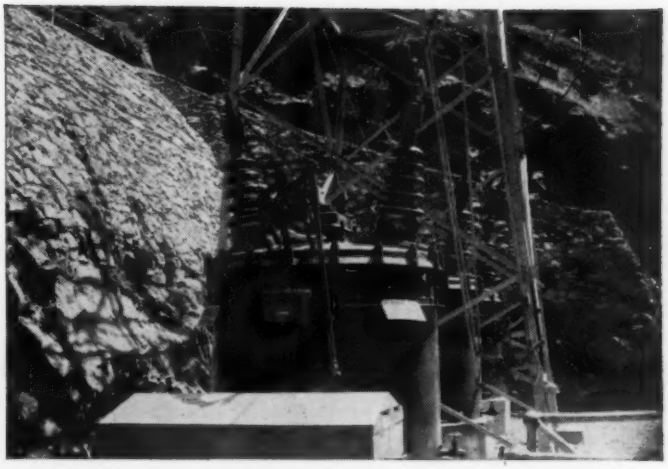
For complete information on 2-way mobile radio, call the General Electric office nearest you, or write: *General Electric Company, Transmitter Division, Electronics Park, Syracuse, N. Y.*

LEADER IN RADIO, TELEVISION AND ELECTRONICS

GENERAL ELECTRIC

163-GEU-6918



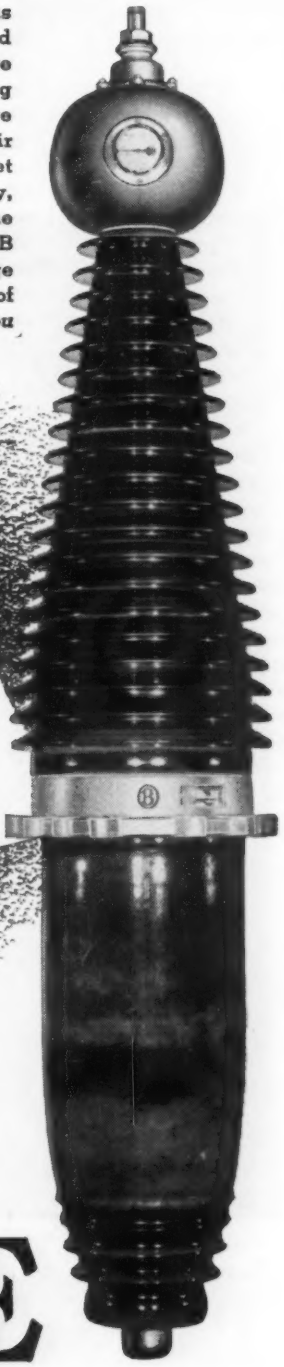


These two O-B bushing installations on the same power company are dated 20 years apart. Hundreds more have gone into service in the intervening years. Engineers on this system have measured O-B performance on their own terms; have attached their own set of values to O-B design and durability, and have voiced their opinion in the most tangible terms by specifying O-B bushings on their newest high-voltage apparatus. This is the final proof of satisfaction--the same satisfaction you can get by specifying O-B.

Ohio Brass

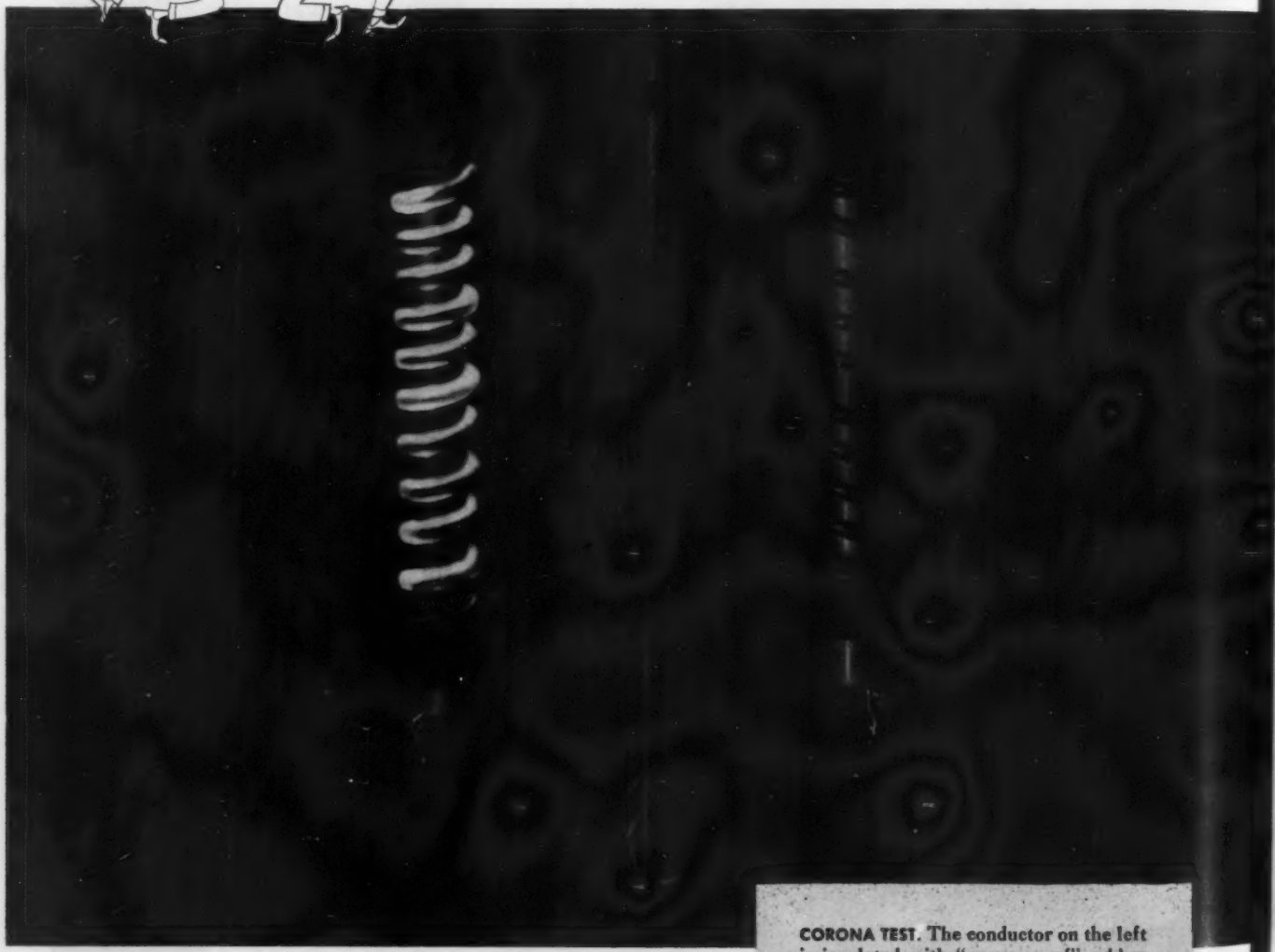
20 years' experience with O-B guides this

BUSHING PREFERENCE



DOUBTERS BECAME BOOSTERS

when they used PS



CORONA TEST. The conductor on the left is insulated with "ozone-proof" rubber but not shielded. Note corona. The conductor on the right has PS Shielding with conducting rubber which prevents corona formation.

PS SHIELDING is applied to single or multiple conductor cables with rubber, paper or varnished cambric insulation. Sheathing can be rubber or lead to suit the application.

Shielded Electrical Cables

● PS Shielding of electrical cable with conducting rubber was introduced several years ago by American Steel and Wire Company. At that time we said that PS Shielding would:

1. Prevent corona formation.
2. Increase the life of power cables and widen the range of applications.
3. Protect against shock hazard by providing a definite ground.
4. Prevent electrical disturbances from being radiated from the cable or absorbed by it.

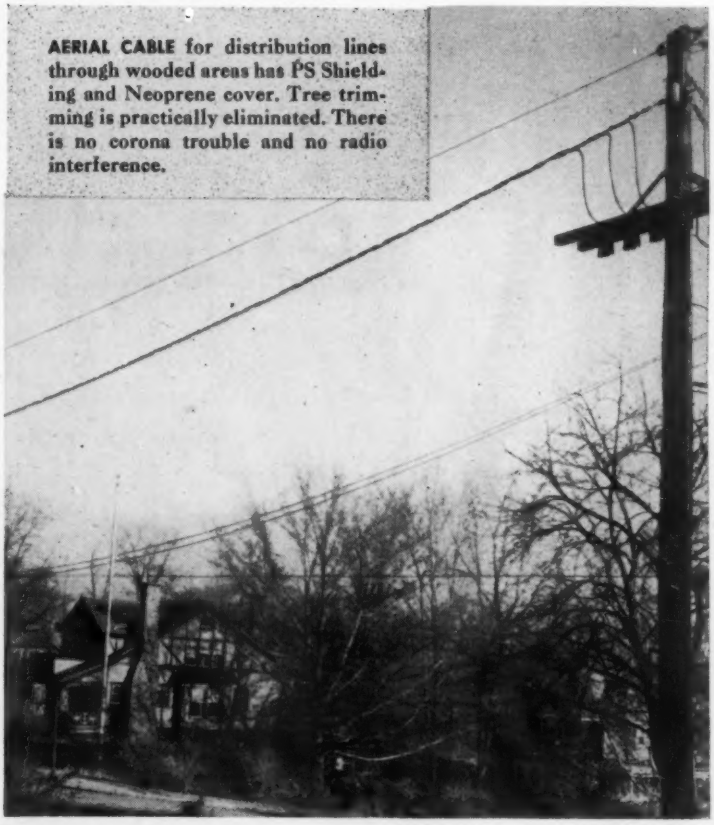
There were many skeptics, for a corona and ozone-proof cable had been the goal of the industry for more than 40 years.

Today, every one of the original claims has been verified. Some of those who doubted the effectiveness of PS Shielding have now become enthusiastic boosters, and many other cable manufacturers have been licensed to use the same type of construction.

PS Shielding with conducting rubber tape is used on many types of portable electrical machine cable, for aerial distribution lines, for heavy power cable and wherever radio interference must be eliminated.

The safety features of PS Shielding have made it ideal for use in mines and other hazardous places.

At present we can supply users with many types of single and multiple conductor cables designed with PS Shielding and sheathed to meet various applications. Write for more complete information on the type of cable you need.



AERIAL CABLE for distribution lines through wooded areas has PS Shielding and Neoprene cover. Tree trimming is practically eliminated. There is no corona trouble and no radio interference.

American Steel & Wire Company

Cleveland, Chicago & New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

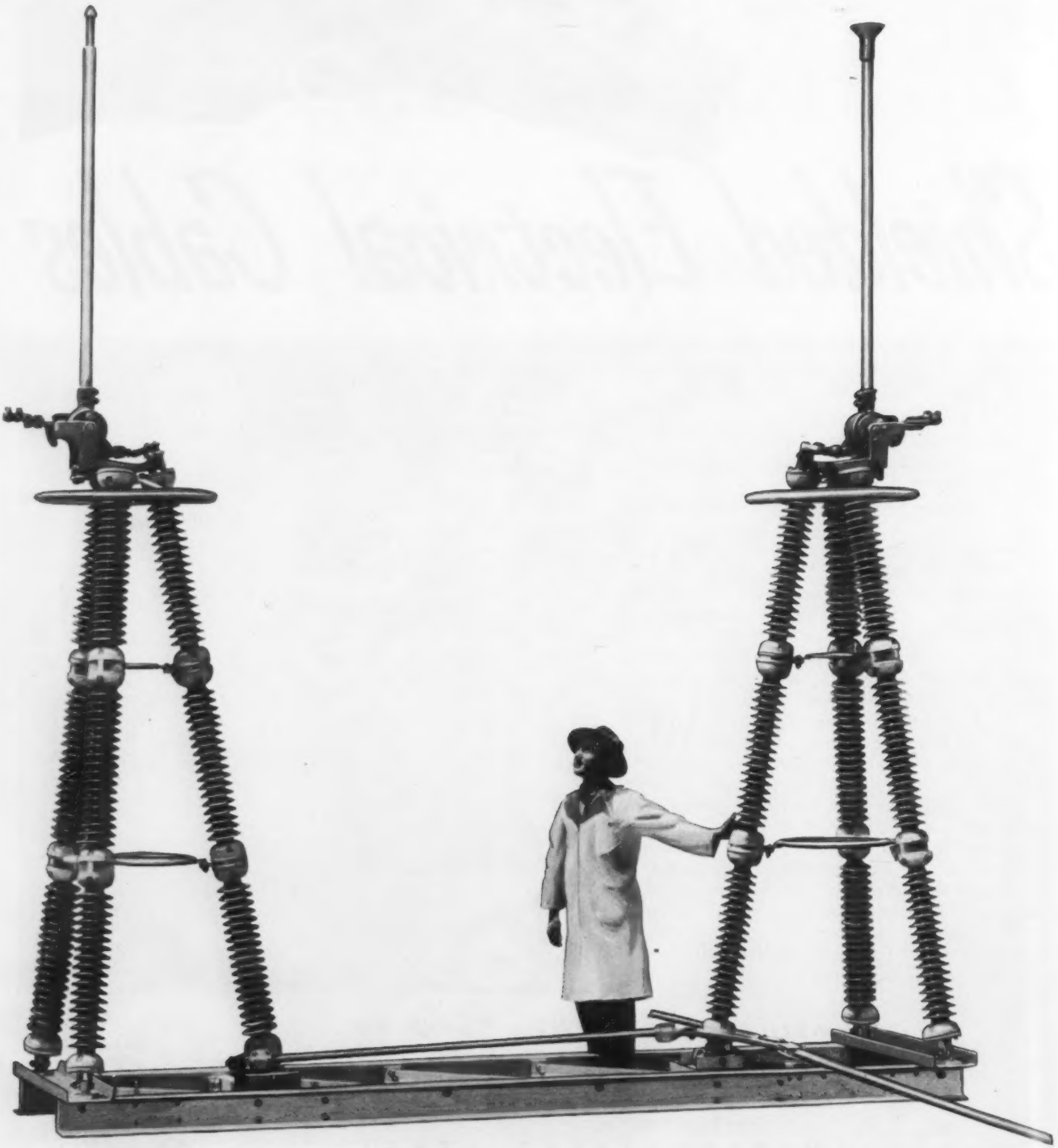
AMERICAN STEEL & WIRE COMPANY · AMERICAN ELECTRICAL WIRE AND CABLE · UNITED STATES STEEL

U·S·S American Electrical Wire and Cable

Cole Electric Co.

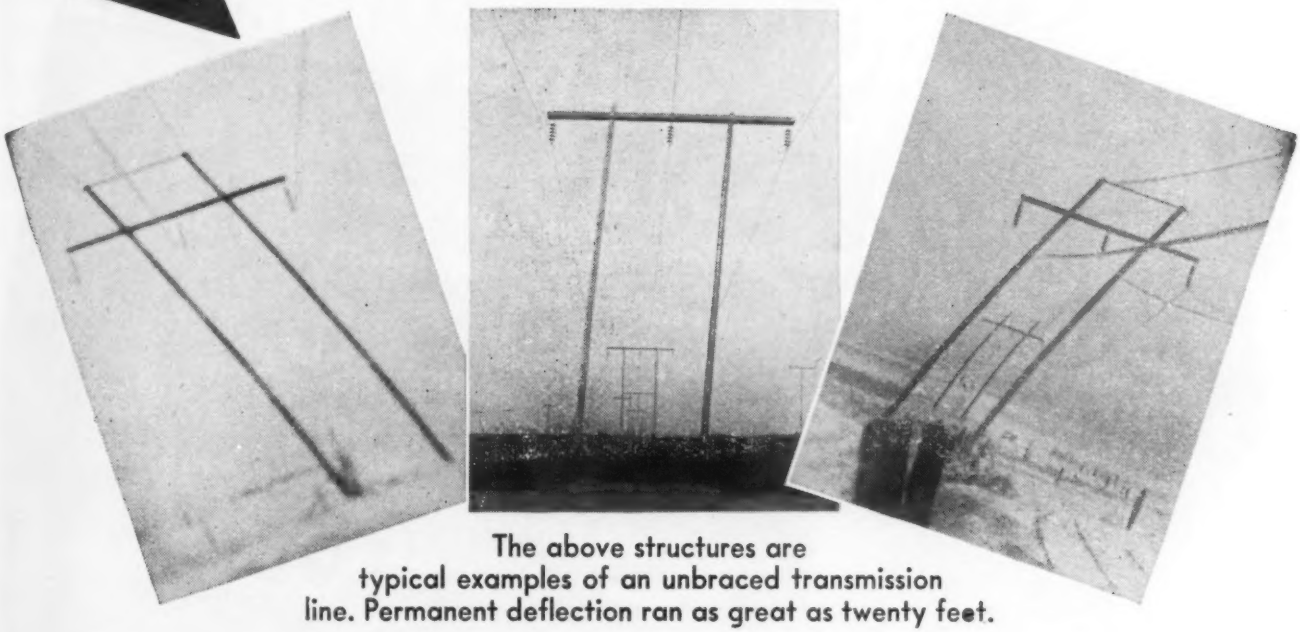
8439 Stellar Drive Culver City, Calif.

TExas 0-4701

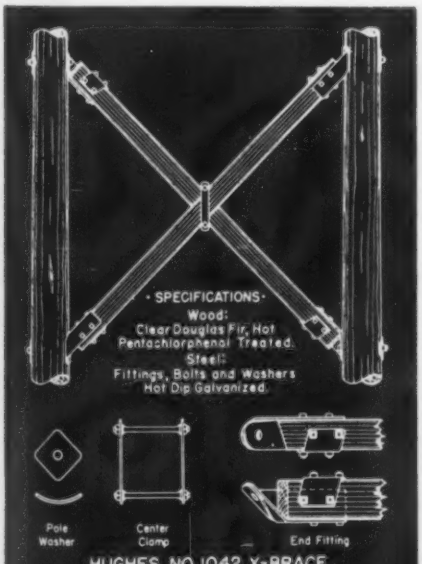


AIR BREAK DISCONNECTING SWITCH
230,000 Volts—1200 Amperes—Type MV
Vertical Break—Three Pole, Single Throw
Group Operated
(One pole shown)

THIS! *is what prompted the pioneering of* HUGHES WOOD X-BRACES



The above structures are typical examples of an unbraced transmission line. Permanent deflection ran as great as twenty feet.

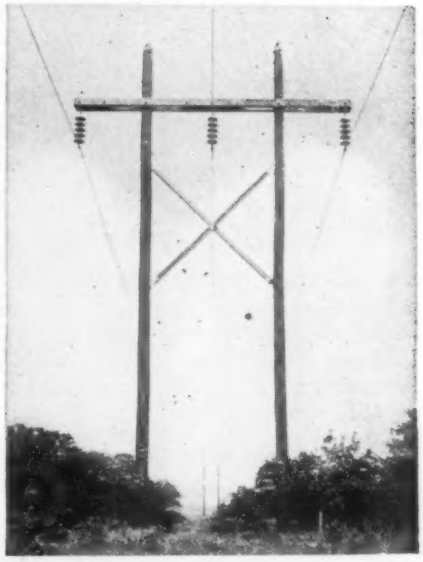


HUGHES NO. 1042 X-BRACE

The unbraced structures above and their excessive top deflections and ground line movements prompted the development of the Hughes X-Braces.

They have proved their worth not only in preventing the above conditions, but also in permitting longer, more economical spans.

For your particular bracing problem we invite your consultation with our Engineering Department.



HUGHES BROTHERS
SEWARD, NEBRASKA
FOUNDED · 1921 INCORPORATED
"HUGHES" TRANSMISSION & DISTRIBUTION MATERIAL MFRS. WOOD METAL

FEATURES YOU NEED FOR

1. High-speed fault clearing . . .
2. Reliable, fast operation for system needs . . .
3. Protection against corrosion . . .
4. Easy access to all inspection points . . .
5. Rigid construction for permanent adjustment . . .
6. Quality material and workmanship for long, trouble-free breaker life . . .

BZO-160 OUTDOOR FLOOR-MOUNTED OIL CIRCUIT BREAKERS furnished in ratings 115 kv and higher; with interrupting capacities up to 5,000,000 kva; circuit interruption within 5 and 3 cycles, reclosing service within 20 cycles.

1. FAULTS CLEARED WITHIN EITHER 3 OR 5 CYCLES! Two *Ruptor* interrupters per phase snuff out arc lightning fast . . . interrupt heavy short circuits with low arc energy release, minimizing oil and contact deterioration. Arc-resistant alloy increases life of contacts . . . means less time out for maintenance.

2. MECHANICALLY TRIP-FREE PNEUMATIC OPERATOR responds fast . . . with immediate and complete release of contacts under all tripping conditions. Its 20-cycle reclosing time helps increase system stability and service continuity.

3. WEATHERPROOF CONSTRUCTION guards breaker components and routine maintenance points. Surface protection against moisture and smooth exterior keep unit clean . . . helps check deterioration.

4. FOR FAST ROUTINE INSPECTIONS, design includes features that mean quick access to pole unit mechanisms, contacts, operator, and allied equipment. Oil and other elements where deterioration might occur can be checked quickly for proper operating condition.

5. ALL-WELDED HEAVY BOILER PLATE TANKS, braced by dome-shaped top and bottom, and solid cylindrical wall extending to the foundation, form rigid pole units. Liberal overall bracing maintains alignment and adjustment between poles.

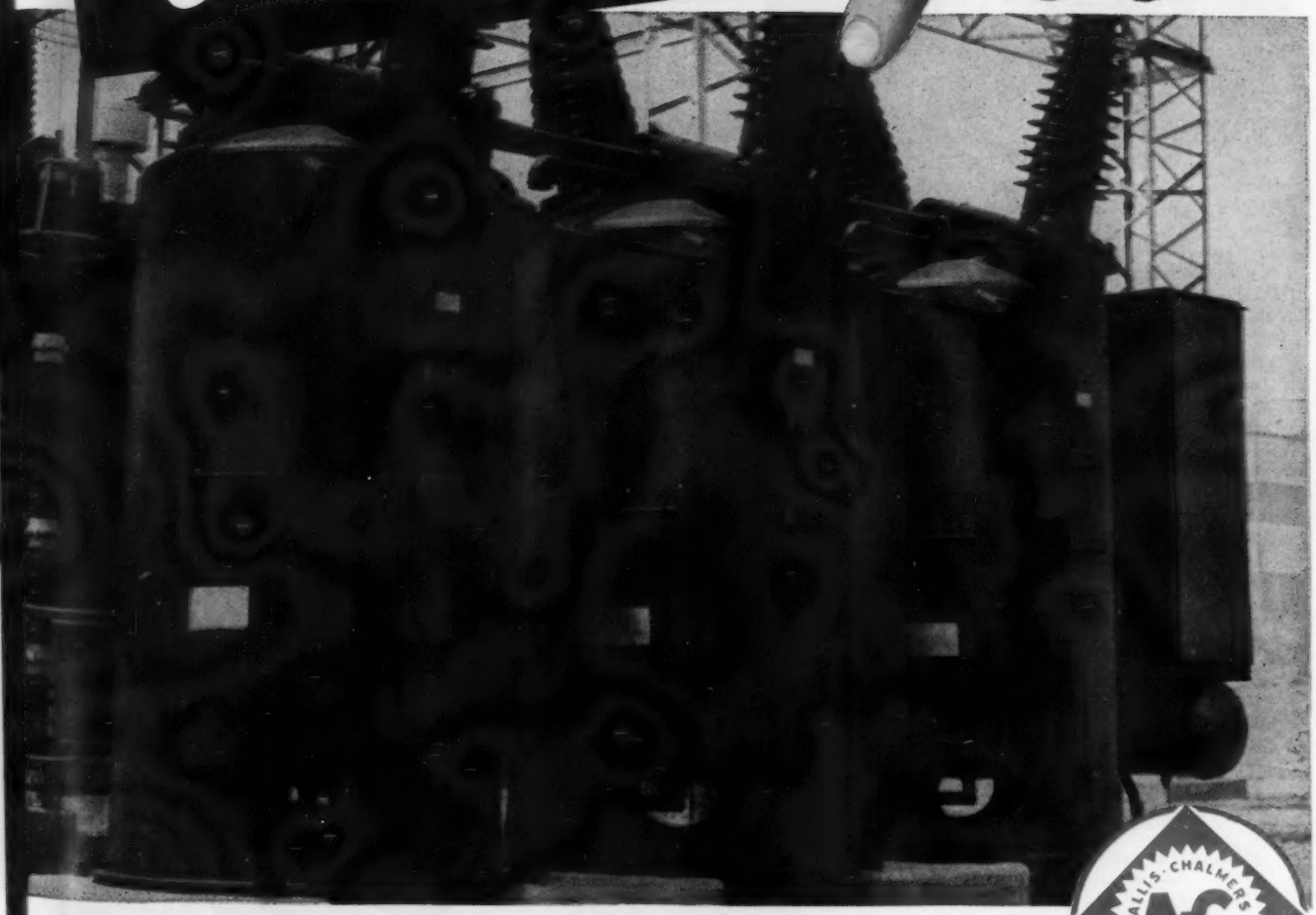
6. DURABLE MATERIALS SELECTED for all parts from tanks to contacts! Allis-Chalmers liberal construction and modern fabrication techniques assure long life . . . dependable performance.

WHY NOT CHECK the many other features behind dependable "5-20" or "3-20" performance of Allis-Chalmers Improved BZO-160 breakers? Call your nearby A-C representative and ask him to go over the complete picture with you. Or write for new bulletin 71B6022C. ALLIS-CHALMERS, MILWAUKEE 1, WIS. *Ruptor* is an Allis-Chalmers trademark.

A 7348

DEPENDABLE PROTECTION

You Find in Allis-Chalmers Improved BZO-160 Oil Circuit Breakers!



Call Allis-Chalmers for power circuit breakers — In standard ASA ratings . . . Indoor and Outdoor!

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment From Generation Through Utilization

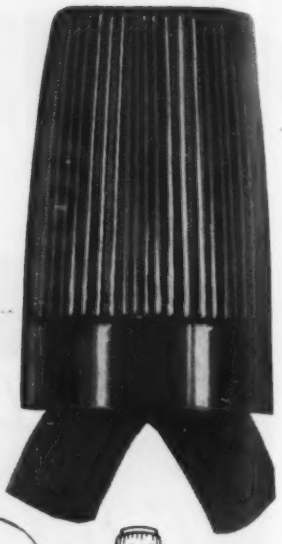
THE BEST WIRE CONNECTORS YOU CAN BUY ARE

IDEAL

Wire-Nuts®

(THE SOLDERLESS, TAPELESS WIRE CONNECTORS)

Patented, No. 1,933,555



Leading Electrical Contractors have used Ideal "Wire-Nuts" for over 20 Years for Circuit and Fixture Wiring...Millions in Use!

Ideal "Wire-Nut" connections are preferred over all other types because they are FASTER—BETTER—and cut wiring costs!

FASTER because—you simply screw them on, like a nut on a bolt. No solder, tape or TOOLS are needed. With a pocket-full of "Wire-Nuts" you can do any ordinary circuit or fixture wiring job from two No. 18 up to three No. 10 wires (solid and/or stranded). Tiresome climbing up and down ladders is minimized!

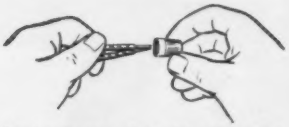
BETTER because—a "Wire-Nut" joint is electrically SAFE and mechanically STRONG. The Bakelite shell insulates the joint and permanently covers the sharp wire ends, while the spiral spring insert automatically twists the wires and presses in the threads that hold the "Wire-Nut" on with a vise-like grip. Once made, a "Wire-Nut" connection cannot shake loose or pull out. Anyone can make a craftsman-like joint—no experience necessary!

Ideal "Wire-Nuts" are made to highest precision standards. All materials are laboratory tested and every "Wire-Nut" is inspected to rigid specifications. Finished "Wire-Nuts" must pass pull-out (strength) tests, electrical resistance tests, insulation breakdown test (2500 volts) and weather tests to make sure that "Wire-Nuts" are the best connectors that money can buy.

You, too, can enjoy all these advantages when you use IDEAL "Wire-Nuts". Get a box at your electrical wholesaler's TODAY... IDEAL INDUSTRIES, Inc., Sycamore, Illinois.

*Trade Mark Reg. U. S. Pat. Off.

Only IDEAL "Wire-Nuts" Give You All These Advantages



Easier to use. Just strip the wires and screw the "Wire-Nut" on—that's all! No pre-twisting of wire. Precision-built spring insert twists, threads and grips the wires in a single operation.

Resist pull-out. Stronger than other wire connectors because of its "nut-on-a-bolt" gripping action. A "Wire-Nut" Joint of two No. 14 wires will stand up to 176 pound pull.

Dependable. Not affected by vibration. In actual service "Wire-Nut" connections have remained secure and perfect under years of heavy vibration.

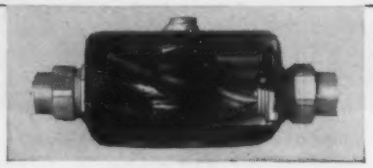
Safe. Weather-proof. Non-corrosive. Fully insulated by plastic shell that prevents "grounds" and "shorts". Sharp wire ends are covered.

Top Quality. Built to precision standards. Inspected and tested with laboratory care... both for quality of materials and workmanship and for strength of finished product.

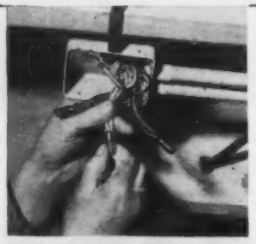
Approved. IDEAL "Wire-Nuts" are listed by Underwriter' Laboratories, Inc. and approved by other leading electrical authorities.

Thousands of Contractors say "Wire-Nuts" are Easier and Faster

MILLIONS OF "WIRE-NUTS" are in use in circuit and fixture wiring in homes, industrial plants and commercial buildings.



"Wire-Nuts" fit compactly into conduit fittings—like peas in a pod.



Circuit wiring with "Wire-Nuts" is simple because there are no tools to handle.

IDEAL

Distributed Through

AMERICA'S LEADING WHOLESALERS

E.C.* Aluminum conductor can mean even greater savings when you buy aerial cable. Compare aerial cable prices: A manufacturer, who supplies both aluminum and copper, states that No. 4-0 three-conductor cable with Alcoa E.C. Aluminum conductor *weighs* 713 lbs. less per 1,000 ft., *costs* much less!

And your economies go further than that. The lighter weight of self-supporting aerial cable with Alcoa E.C. Aluminum conductor allows longer spans, or less sag with present pole spacing. Transportation costs are lower on bulk shipments.

Alcoa makes light, strong, conductive E.C. Aluminum; leading wire and cable manufacturers draw, strand and insulate it, and sell it under their own trade marks. Check with your cable supplier on aerial cable with insulated Alcoa E.C. Aluminum conductor now. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.

*E.C.: *Electrical Conductor* Aluminum.

ALCOA EC ALUMINUM

ALCOA

FOR ELECTRIC WIRE AND CABLE

Time Tested!

Early Model,
5 Kw, Air-Cooled
Transformer

IN 1886 the first alternating current plant . . . with transformers and parallel distribution . . . was built in America. Just ten years later, the Moloney Electric Company was organized. Moloney was thus one of the early pioneers in the manufacture of transformers. In 1896 the founders of the Moloney Company had developed and marketed their new Core Type Transformer, the type that was destined to revolutionize the making of transformers. But this was only the beginning of Moloney pioneering . . . pioneering that was to play a conspicuous part in the development of electrical transmission and distribution which has created in our time . . . the miracle of Industrial America.

MOLONEY TR

50 eventful years have brought to Moloney Electric Company an enviable record of pioneering achievement. After developing the Core Type Transformer, Moloney was first in this country to commercially introduce the use of Silicon steel in cores. Another far-reaching Moloney development was the successful adaptation of the three-wire core type transformer. Today Moloney Transformers are known throughout the world for . . . unexcelled design . . . careful workmanship . . . trouble-free operation. Moloney, today, as in 1896, devotes its entire facilities, both in manufacturing and research, exclusively to the production of . . . transformers.

MOLONEY ELECTRI

POWER AND DISTRIBUTION TRANSFORMERS

FACTORIES AT SAINT LOUIS 20, MISSOURI

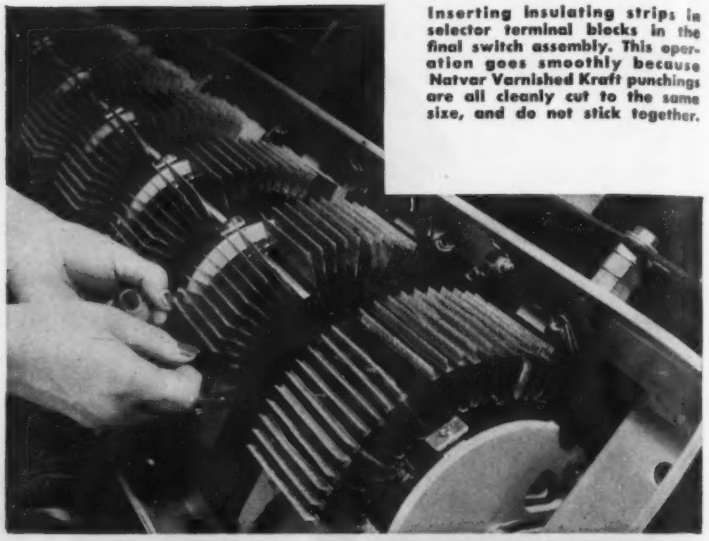
Modern Power Transformer

RI COMPANY

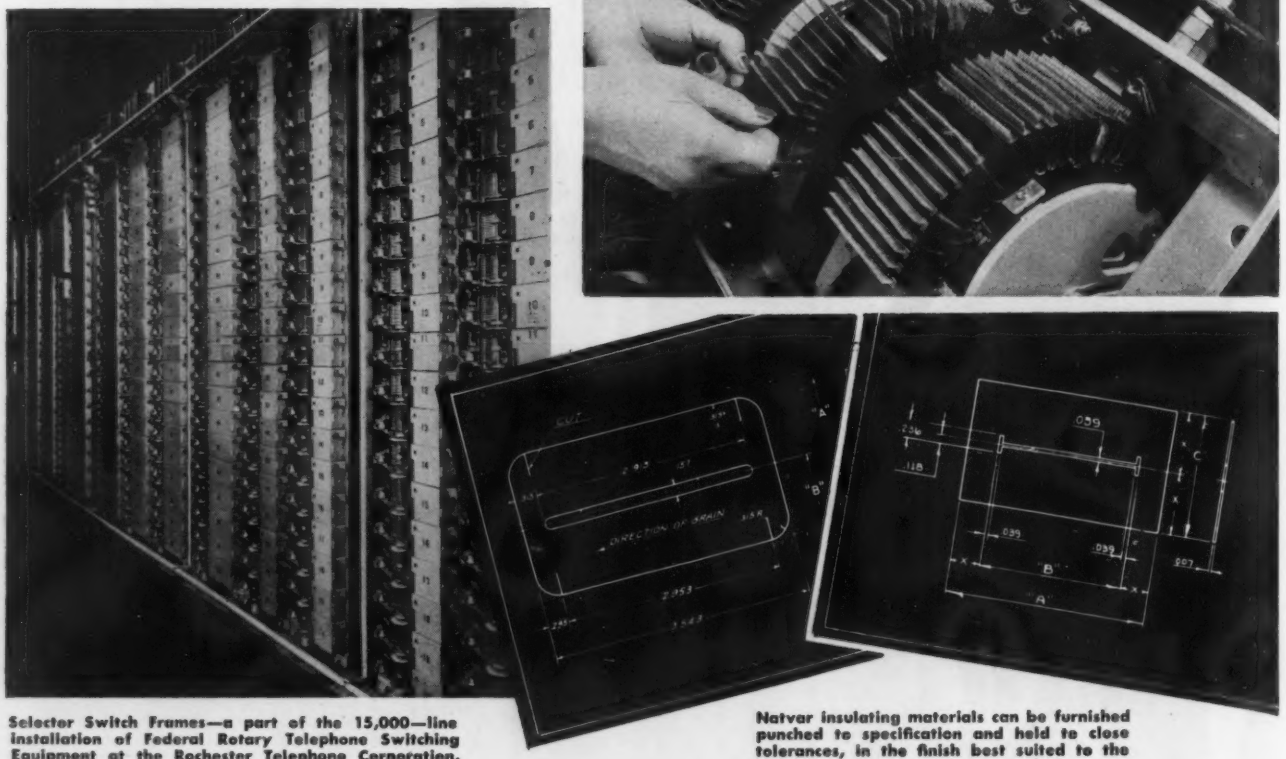
R S EXCLUSIVELY SINCE 1896

RI AND TORONTO, ONTARIO, CANADA

Compact... Dependable



Inserting insulating strips in selector terminal blocks in the final switch assembly. This operation goes smoothly because Natvar Varnished Kraft punchings are all cleanly cut to the same size, and do not stick together.



Selector Switch Frames—a part of the 15,000—line installation of Federal Rotary Telephone Switching Equipment at the Rochester Telephone Corporation, Rochester, N. Y.

Natvar insulating materials can be furnished punched to specification and held to close tolerances, in the finish best suited to the operation.

The 7A-2 Rotary System is modern high speed automatic telephone equipment, built by Federal Telephone and Radio Corporation, Clifton, N. J., an I. T. & T. associate. It must be both compact and dependable. This calls for minimum clearances without sacrifice of reliability of performance or ease of maintenance.

In the words of one of their engineers:

> "To produce a system which fulfills the many complex circuit requirements of today, which is at the same time sound and robust mechanically, requires the closest cooperation between circuit and mechanical designers."

Natvar Varnished Kraft insulators are an example of this cooperation. Here an electrical insulating material has been used to provide both electrical and mechanical protection to the selector terminal blocks and to the ribbon cable which multiples the terminal banks.

If your requirements call for insulating materials with good physical and electrical performance characteristics, in bulk or cut to your own specifications, it will pay you to use Natvar. Get in touch with your Natvar distributor, or with us direct.

Represented by Electrical Specialty Co.

San Francisco 3	Los Angeles 13	Portland 5	Seattle 1	Denver 2
316 Eleventh St.	418 East Third St.	325 N.W. 6th Ave.	2406 First Ave.	1015 - 21st St.

Natvar Products

- Varnished cambric—straight cut and bias
- Varnished cable tape
- Varnished canvas
- Varnished duck
- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Varnished tubings and sleevings
- Varnished identification markers
- Lacquered tubings and sleevings
- Extruded vinyl tubing and tape
- Extruded vinyl identification markers

Ask for Catalog No. 21

THE NATIONAL VARNISHED PRODUCTS Corporation

TELEPHONE RAHWAY 7-2171

CABLE ADDRESS NATVAR: RAHWAY, N. J.

233 RANDOLPH AVENUE ★ WOODBRIDGE NEW JERSEY

WE LINED UP THE FLUX PATH

TO CUT DOWN SIZE!

Ten years ago, General Electric introduced the Spirakore transformer. It was revolutionary! It was the first distribution transformer in which the flux through the core followed grain direction of the steel. Literally, the crystals of cold-rolled steel were lined up to provide the best possible flux path and then, by spirally winding the core, we lined up the steel so the flux would follow this path. Magnetic properties of the steel were so improved that we were able to build a much smaller, lighter transformer—that sold at a much lower price.

Now many *small* distribution transformers are built along these lines. But General Electric has not stopped here. By adapting this same principle to larger cores, we have brought weight savings to the entire line of single-phase, outdoor distribution transformers—up through 500 kva. Nor did we stop with the core. We improved the impulse strength of the coils—improved the clamping construction for greater mechanical strength. We sealed the tanks to prolong oil life—and even developed a new, better synthetic resin paint that is baked on, and which reduces maintenance costs.

Today—as ten years ago when lighter, smaller Spirakore transformers made history—Spirakore still leads the field—the finest distribution transformer we have ever made, the finest you can buy. Ask for bulletins GEA-4885 and GEA-4521. ***Apparatus Dept., General Electric Company, Schenectady 5, N. Y.***

GENERAL ELECTRIC

402-86

Install E. M. T. Faster and Neater with BRIEGEL Thin-Wall Fittings

NEATER • FASTER • STRONGER • APPROVED

All B-M Fittings Carry the Underwriters' Seal of Approval

FOR faster, neater and stronger thin wall conduit connections insist on either Briegel Indenter or Briegel Self-threading type all steel, one piece connectors and couplings.

B-M Indenter fittings, the only approved couplings and connectors of this type, have long enjoyed wider use and application than any other method of installing E.M.T.

The new B-M Self-threading fittings now make it possible to have threaded, raintight E. M. T. connections without the use of dies. Two complete turns with a pair of pliers threads the tubing and screws the fittings into a locked position, which results in the strongest connection possible and one that will withstand severe vibration.

Whatever the thin wall job might be, you will find that you can do it neater, faster and better with Briegel UL Approved E.M.T. fittings.

BRIEGEL METHOD TOOL CO.

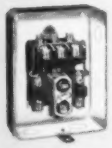
GALVA, ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill. Clifton Conduit Co., Jersey City, N.J. The Steelduct Co., Youngstown, Ohio Nat. Enameling & Mfg. Co., Pittsburgh
Clayton Mark & Co., Evanston, Ill. Gen. Electric Co., Bridgeport, Conn. Enameled Metals, Pittsburgh, Penn. Kondu Mfg. Co., Ltd., Preston, Ontario

When you plan that new production line

you'll find the right control for every machine in the Allen-Bradley line



Manual Starters

Solenoid Relays

Small Solenoid Starters

Large Solenoid Starters

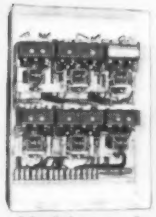
Are you making any plant layout changes? What about your motor controls?

You can get the best production efficiency if each machine has exactly the right starter . . . the right push button . . . the right limit switch.

They are all available . . . in the big Allen-Bradley line. On special drives you can work out remarkable timesaving and laborsaving control combinations with Allen-Bradley relays, timers, drum switches, contactors, and pilot lights. And Allen-Bradley engineers are always glad to help you.

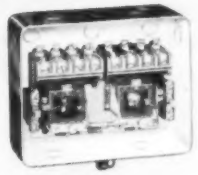
Why not write for the 48-page Allen-Bradley catalog, today!

ALLEN-BRADLEY CO.
1316 S. Second Street Milwaukee 4, Wis.



Multispeed Starters

Combination Starters

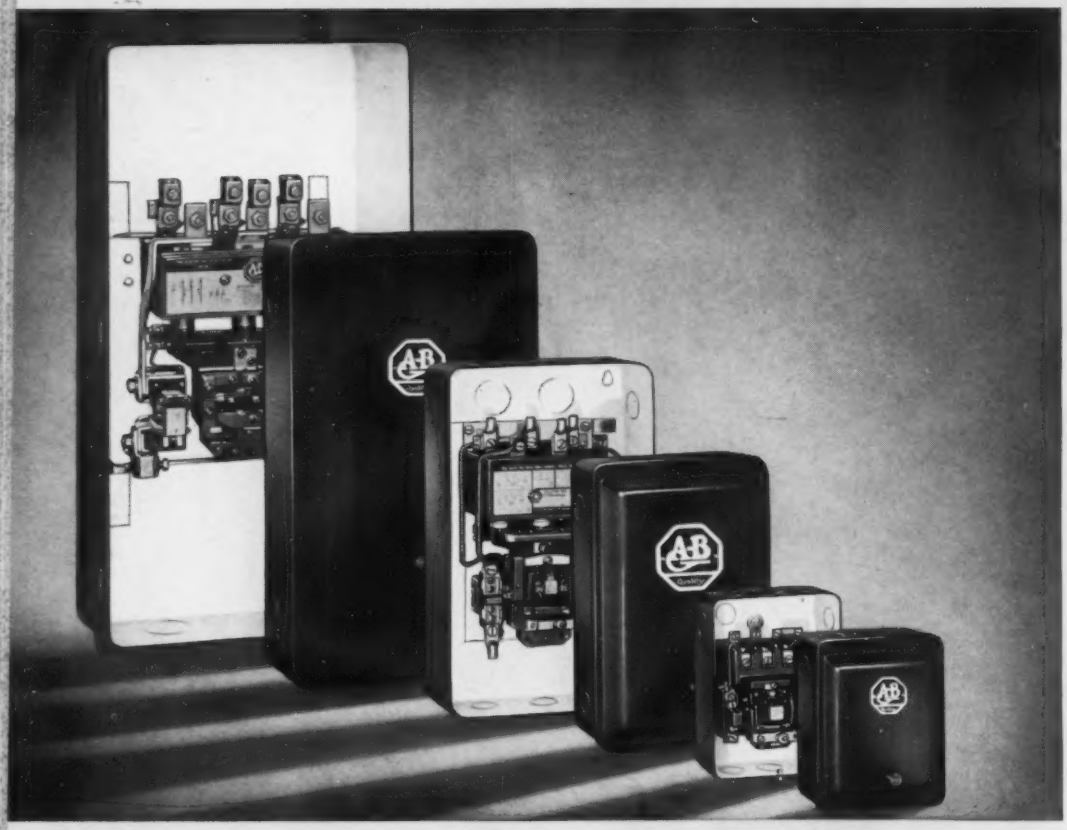


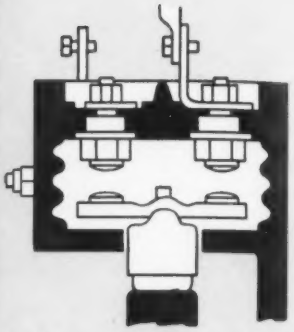
Reversing Switches

A-B Quality

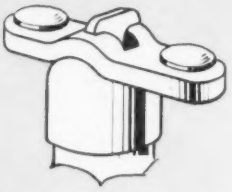
ALLEN-BRADLEY

MANUAL & AUTOMATIC QUALITY MOTOR STARTERS





Sectional view of contact enclosure showing simple up-and-down action of contacts in arc hood.



All Allen-Bradley Solenoid Starters have double-break, silver-alloy contacts — no jumpers—nothing to interfere with instant opening and closing of contacts.

No Pins • No Pivots
No Hinges • No Bearings

The solenoid plunger carries the three moving contacts that operate within arc hood. Nothing could be simpler or more reliable.

Count the Moving Parts . . .

ONLY ONE!

Therefore–

Count the Trouble-Free Operations

MILLIONS OF THEM!

That's the real secret of Allen-Bradley controls . . . there is ONLY ONE MOVING PART . . . no trouble-making gadgets like bearings, pins, pivots, hinges, or jumpers. With ONLY ONE MOVING PART there is little chance for trouble. Hence . . . MILLIONS OF TROUBLE-FREE OPERATIONS. With 8 or 10 or more moving parts, you can almost bet on having trouble.

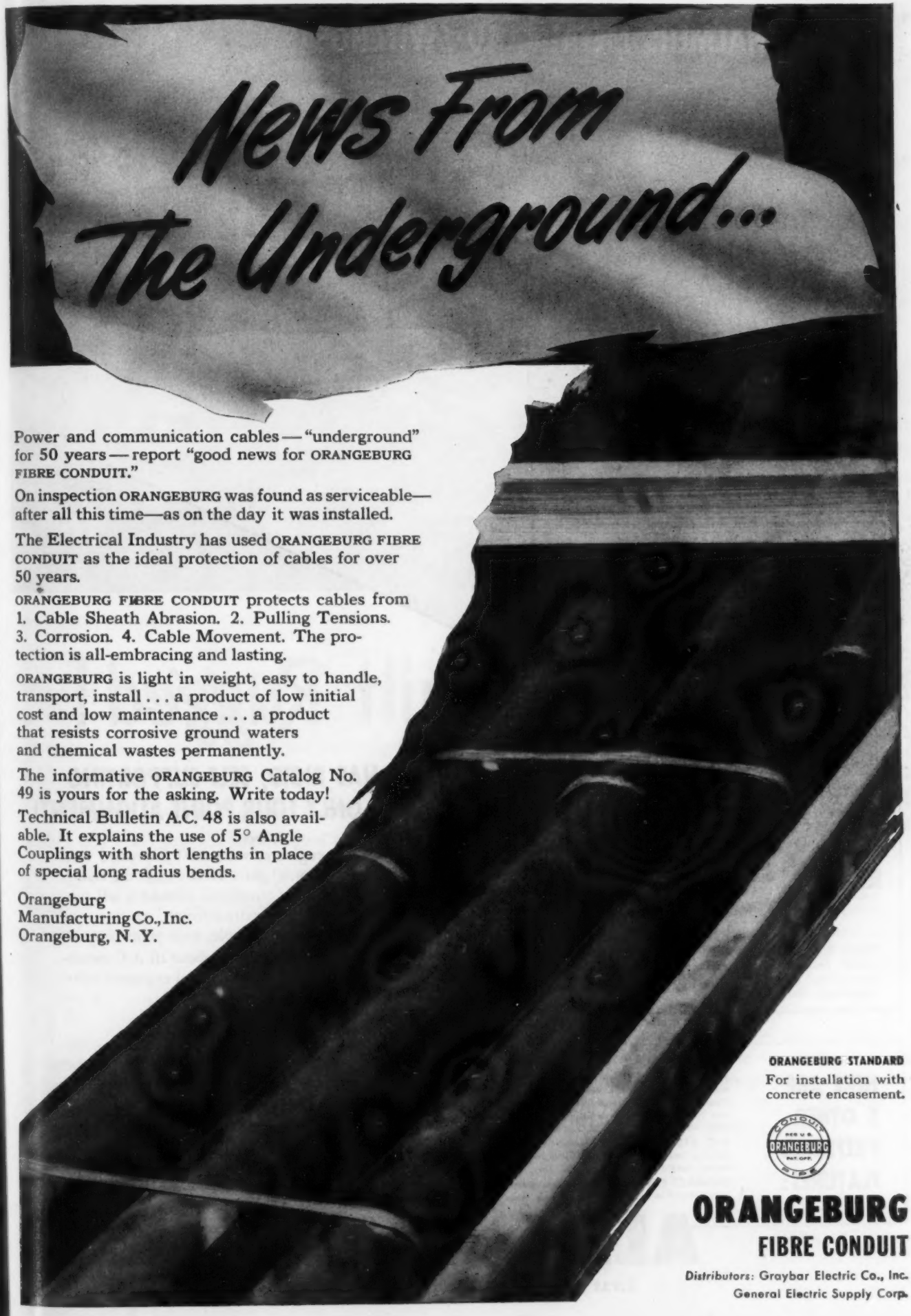
It is simple arithmetic . . . that is how it adds up. It also explains why Allen-Bradley controls are the first choice of machine tool builders.

Make your controls trouble free . . . maintenance free . . . complaint free. Just specify Allen-Bradley when you order motor controls.

ALLEN-BRADLEY CO.

1316 S. Second St. Milwaukee, Wis.

ALLEN-BRADLEY
SOLENOID STARTERS
QUALITY



Power and communication cables — "underground" for 50 years — report "good news for ORANGEBURG FIBRE CONDUIT."

On inspection ORANGEBURG was found as serviceable—after all this time—as on the day it was installed.

The Electrical Industry has used ORANGEBURG FIBRE CONDUIT as the ideal protection of cables for over 50 years.

ORANGEBURG FIBRE CONDUIT protects cables from 1. Cable Sheath Abrasion. 2. Pulling Tensions. 3. Corrosion. 4. Cable Movement. The protection is all-embracing and lasting.

ORANGEBURG is light in weight, easy to handle, transport, install . . . a product of low initial cost and low maintenance . . . a product that resists corrosive ground waters and chemical wastes permanently.

The informative ORANGEBURG Catalog No. 49 is yours for the asking. Write today!

Technical Bulletin A.C. 48 is also available. It explains the use of 5° Angle Couplings with short lengths in place of special long radius bends.

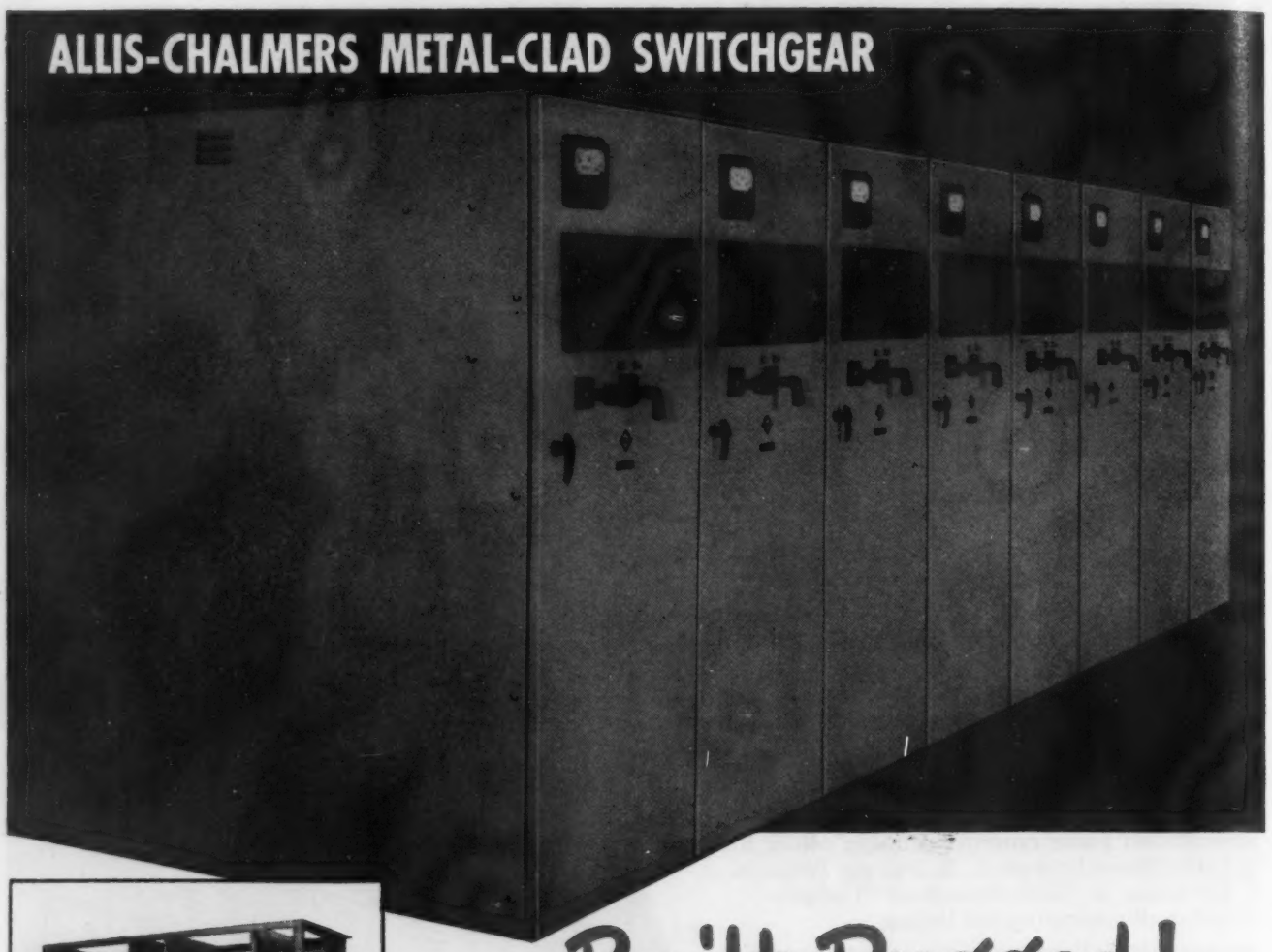
Orangeburg
Manufacturing Co., Inc.
Orangeburg, N. Y.

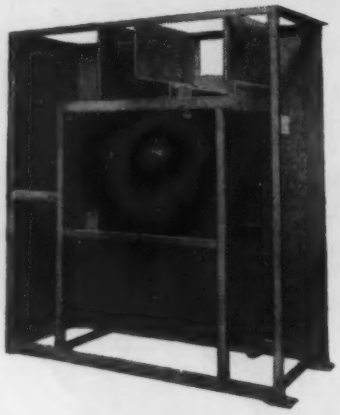
ORANGEBURG STANDARD
For installation with concrete encasement.

ORANGEBURG
FIBRE CONDUIT

Distributors: Graybar Electric Co., Inc.
General Electric Supply Corp.

ALLIS-CHALMERS METAL-CLAD SWITCHGEAR





THIS STRONG FRAMEWORK really *protects* switchgear . . . heavy steel plates and angles are reinforced throughout.

Built Rugged!

A-C SWITCHGEAR HAS RIGID, SELF-SUPPORTING STRUCTURE—REQUIRES ONLY FOUR POINT ALIGNMENT!

A RECENT SURVEY showed that engineers were most impressed with the rugged construction of A-C switchgear. Here's why: the framework of steel angles and formed plates is reinforced to make a self-supporting structure; joints are lap welded for extra strength, structures are assembled on two full length channels for simple, four point support.

This kind of sound engineering is reflected throughout all A-C switchgear . . . that's why it is *preferred* by operating men and engineers alike.

ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2502

Ruptair, Ruptor are Allis-Chalmers trademarks.

HERE ARE 5 OTHER PREFERRED FEATURES:

HORIZONTAL ARC INTERRUPTION . . . *Ruptair* magnetic air circuit breakers eliminate need for "puffers" . . . natural thermal effect assists arc into the arc chute. Especially effective at low currents when magnetic effect is weak.

A-C DESIGNED arcing contacts of high melting point alloys minimize burning, assure low maintenance, long life under repetitive duty.

CONTACT FINGERS on removable element permits easy inspection without de-energizing main bus.

PREDICTABLE low installation costs . . . unit is "packaged," ready for connection. Detailed drawings provided for each installation.

ADEQUATE BUS INSULATION . . . no-corona tape, bakelized paper tubing, insulating tape eliminate compound-filled joints. Easily installed in field and removed for installation changes.

A-C builds these circuit breakers: Air Blast, *Ruptair* magnetic, *Ruptor* oil, Low Voltage air.

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

ONLY PROPER COMPOUNDING AND FRICTIONING GIVE *Longest-Lived* SPLICING TAPES

Okonite Rubber and Manson Friction Tapes provide every essential characteristic

For over 60 years, electrical men who want the best have specified Okonite Rubber and Manson Friction Tapes. With today's emphasis on lasting values, these tapes are more important than ever.

Properly compounded from Up-River Fine Para rubber, Okonite Tapes fuse into a homogeneous wall of tough insulation, high in dielectric strength, elastic, resilient and permanently waterproof.

In Manson Friction Tapes, new, naturally tacky rubber has been properly frictioned into a closely-woven fabric to give the true adhesiveness plus the aging and weathering qualities needed for lasting protection of the insulating compound.

with today's high installation costs* only the *Longest-Lived* splices will be economical

* The lifetime cost of an electrical splice is more important — and more economical in the long run — than the first cost of the tape that makes it. Okonite and Manson Tapes are built to deliver maximum value when you consider (1) seriousness of a failure and (2) doubled installation cost when splice has to be rebuilt.

FOR INSTALLATION CREWS OF PUBLIC UTILITIES

Okonite and Manson Tapes are widely used in many kinds of field work. Whether for splicing underground cable, risers or overhead lines, Okonite and Manson Tapes offer not only long service life but also ease of handling and splicing — with resulting lower application costs.

Let us send you a ½-pound trial can of each of these tapes — free — enough to make a dozen or more splices in #6 wire. See for yourself how much better jobs you get. Just make the request on your business letterhead. The Okonite Company, 20 Canal Street, Passaic, N. J.

6820

OKONITE (OKONITE SINCE 1878) **and MANSON TAPES**

THE BEST TAPE IS YOUR BEST POLICY

Shell scientists believe you can profit by knowing about

SHELL TALONA OIL

developed to be the world's finest heavy duty oil

Figure what oil breakdown can cost you

With sludge, carbon and lacquer come ring-sticking . . . lowered efficiency and engine wear. And your cost is more than repair and replacement. The *time out for overhaul* runs operating costs way up . . . and cuts profits way down.

Nine years work went into Shell Talona Oil

A hundred or more formulas were developed and tested by Shell Research to find ways to strengthen oil . . . help it resist acid, sludge, carbon and lacquer formation. Yes, and *reduce engine wear.*

One oil, now marketed as *Shell Talona Oil,* was in a class by itself. In the most grueling tests, Shell Talona Oil kept sludge to a harmless minimum; kept bearings free from corrosion; kept pistons and rings virtually free of carbon and lacquer deposits. And as for wear —it couldn't be measured by ordinary standards on pistons or cylinder walls.

It pays off to you this way

In high speed Diesel and heavy duty gasoline engines, Shell Talona Oil promises less engine wear . . . longer operation at peak efficiency. Fuel economy should improve. And with proper care of your air cleaners and oil filters, periods between overhauls should lengthen considerably.

Ask your Shell representative for Shell Talona Oil. It's on sale now—and there's absolutely no other like it.

ARE YOU ABSOLUTELY SURE YOU ARE GETTING ALL THAT'S NEW IN LUBRICATION?

Your Shell Lubrication Engineer can make a complete study and analysis of your plant and machines . . . give you engineering counsel, advice on new lubricants and their application . . . help you set up schedules and controls for each and every machine. For that kind of service, call in your Shell Lubrication Engineer.

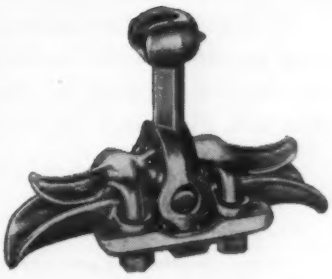
SHELL

View of the New Hope-Plymouth Meeting Line . . . 17 years' service by BTC Forged Steel Clamps and Fittings.

The New Hope — Plymouth Meeting Line is a link in one of the most important utility interconnections serving a densely-populated industrial area.

Built for the Philadelphia Electric Company in 1930 by the United Engineers and Constructors, this 220 kv. line is 29.57 miles long carrying 795,000 cm. A.C.S.R. conductor with armor rods and 203,200 cm. A.C.S.R. ground wire with armor rods. BTC Trunnion-type Cable-releasing Suspension Clamps are used on conductor and overhead ground wires together with miscellaneous BTC Suspension and Strain Fittings. For protection of the tower in case of cable failure, each clamp incorporates a simple, positive cable-releasing device actuated by a predetermined angular displacement of the insulator string or ground wire linkage. BTC Forged Steel Caps are also used on the Suspension Insulators.

This line has had an entirely satisfactory performance record; further evidence of the wisdom in obtaining sound engineering and good materials. For transmission line design, specify BTC Forged Steel Line Hardware.



Sold only through your insulator manufacturer

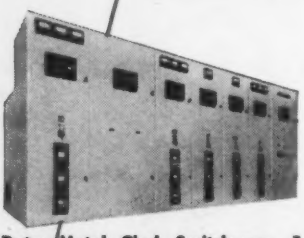
THE BREWER-TITCHENER CORPORATION, CORTLAND, N. Y.

It's a case of getting 4 faster . . . thanks to 1!

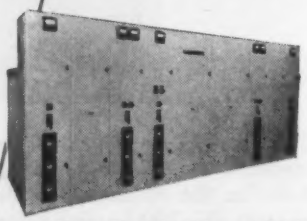
When you standardize with Westinghouse Unitized Switchgear, you enjoy four important features that contribute to more efficient, less costly operation. And you get these advantages sooner because of still another feature of standardization.

You enjoy, 1st, greater service continuity . . . because breakers can be replaced in a matter of minutes; 2nd, greater safety . . . achieved by positive interlocking devices, full steel barriers, improved ventilation and insulation, and complete isolation of live parts; 3rd, greater versatility . . . thanks to a uniform design that simplifies expansion and conversion; 4th, longer life . . . through durable metal-enclosed structures. *And lastly—the advantage that expedites the other four—minimum manufacturing time . . . through standardized methods that put your switchgear units on the job sooner.*

There's more information about Unitized Switchgear in booklets now available. Write—indicating your requirements—to your nearest Westinghouse office, or Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-60669



Heavy-Duty, Metal-Clad Switchgear, 5,000 to 15,000 volts, 600 to 2,000 amperes, 150,000 to 500,000-kva interrupting capacity.



Light-Duty, Metal-Clad Switchgear, 5,000 volts, 600 and 1,200 amperes, 50,000-kva interrupting capacity.

- Lower planning and ordering costs
- Lower manufactured cost
- Lower installation cost
- Lower operation and maintenance costs
- Greater service continuity
- Greater safety
- Greater versatility
- Longer life
- Shorter manufacturing time
- Superior equipment for outdoor requirements

IT'S STANDARDIZED!

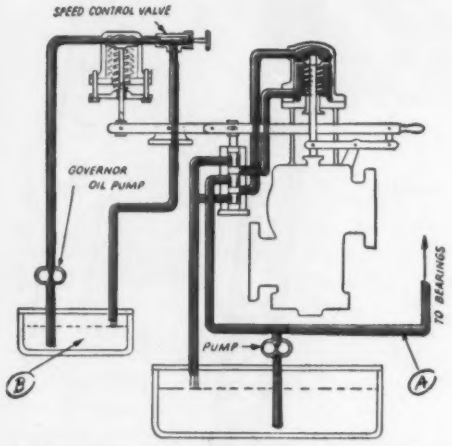
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

UNITIZED SWITCHGEAR

INDOOR AND OUTDOOR SERVICE

CASE 1048—STOPPING RUSTING, LACQUERING, SLUDGING IN STEAM TURBINES.



VARIABLE-SPEED OIL-RELAY GOVERNOR

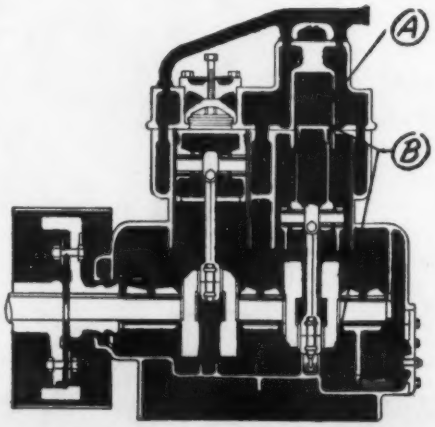
Charges of inhibited Calol OC Turbine Oil in various size turbines gave service many times longer than normally obtained with straight-mineral oils. Use in large and small units ... ring-oilers, circulating oil lubricating systems and oil-actuated governor relay systems. Comes in four grades: 9, 11, 15, 19.

A. Contains highly effective corrosion inhibitor and has excellent metal-wetting ability. Keeps moisture in oil systems from contacting metal.

B. Oxidation inhibitor resists deterioration of oil and sludge formation caused by heat, moisture, air, dirt ... prevents plugging of oil lines.

Calol OC Turbine Oil in regular service showed no increase in acidity after several years ... turbine parts remained in same condition as when installed ... water and solid contaminants separated readily from oil in centrifuging or filtering systems.

CASE 1045--MINIMIZING OIL OXIDATION AND DEPOSIT TROUBLE IN AIR COMPRESSORS.



TWO-STAGE, 2 CYLINDER AIR COMPRESSOR

In air compressors of all types and sizes, heat-resistant Calol Multi-Service Oil materially reduced deposits on discharge valves, cylinders, bearings and in crankcases. Comes in six viscosity grades: 45X, approximately SAE 10; 50X, SAE 20 medium; 55X, SAE 20 heavy; 65X, SAE 30; 75X, SAE 40; 85X, SAE 50.

A. Detergent compound keeps parts cleaned of gum and lacquer and prevents ring sticking . . . provides constant lubrication on hot spots.

B. Oxidation inhibitor prevents formation of sludge and other deposits caused by air, extreme heat, moisture, dust and other contaminants.

Has high metal-adherent quality - maintains film of oil in idle machines which prevents starting wear and protects against rusting.

Calol Multi-Service Oil will correct gum and lacquer problems in many machines - in air compressors, Diesel and natural gas engines, enclosed gears, bearings.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

STANDARD TECHNICAL SERVICE will make your maintenance job easier. If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will gladly give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20, California.

RPM CALOL

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

More current-carrying capacity for *less* money... with Rome Type RH Building wire

That's the simple reason why it is good economy to use Rome Type RH Building Wire. Type RH provides GREATER CURRENT CARRYING CAPACITY PER DOLLAR OF INSTALLATION COST.

As compared to all other types of Building Wires, National Electrical Code current carrying capacities and higher operating temperature for Type RH, permit, for equal amperages, the use of smaller conductor sizes in nearly every instance.

WHERE VOLTAGE DROP IS NOT A PROBLEM, as in most feeder circuits, you can realize all around savings . . . actual dollar savings . . . by installing "Rome" Type RH Building Wire.

HERE IS A TYPICAL EXAMPLE:

Circuit Requirement of 285 Amps.	Type R	Type RH
*Required Conductor Size	500,000 CM	300,000 CM
Approximate Outside Diameter	1.10"	.91"
Weight per 1000 Ft.	1815 Lbs.	1139 Lbs.
*Required Conduit Size (3 conductor)	3"	2½"
*Permissible Operating Temperature	60°C	75°C

** In accordance with 1947 National Electrical Code*

FIGURE FOR YOURSELF, the savings in cable cost, in this particular case as much as 26 percent . . . the savings of smaller conduit and fittings . . . the ease of handling lighter materials . . . the longer life of a superior heat-resistant insulation.

To Save Feeder Circuit Costs . . .
Specify Rome RH

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK

PACIFIC ELECTRO SALES, INC., Pacific Coast Agents

SALT LAKE CITY 1, UTAH — 419 Beneficial Life Bldg.
PORTLAND 9, OREGON — 1233 N. W. Twelfth Street
LOS ANGELES 21, CALIF. — 2038 Bay Street
SAN FRANCISCO 3, CALIF. — 1045 Bryant Street
SEATTLE 4, WASH. — 3401 Fourth Ave., So.

PRIMARY FUSE CUTOUTS

for all service requirements

INDICATING—DROP-OUT—RECLOSING

Interchangeable doors make these enclosed cutouts the most versatile in their field. *Three interchangeable doors*—indicating and drop-out, two-element reclosing, and disconnect—available for each current rating; *fit both the 5-kv and the 7.5-kv housings*. Just five major stock parts, for both 50- and 100-ampere ratings, fill all your requirements. Bulletin GEA-3448-B tells the complete story.

NON-INDICATING

These cutouts, lowest in price of all wet-process porcelain-enclosed cutouts, enable appreciable savings where indication is not necessary.

With exceptionally liberal design of contact areas and interlocking barriers, these cutouts are tops in the non-indicating field.

More than a million and a half in service have proved their high mechanical and electrical strength, and overall durability. Bulletin GEA-2390-C gives complete information.

General Electric also has a complete line of oil fuse cutouts, secondary cutouts and fuses, and universal conventional and Hi-surge fuse links.
Apparatus Department, General Electric Company, Schenectady 5, N. Y.

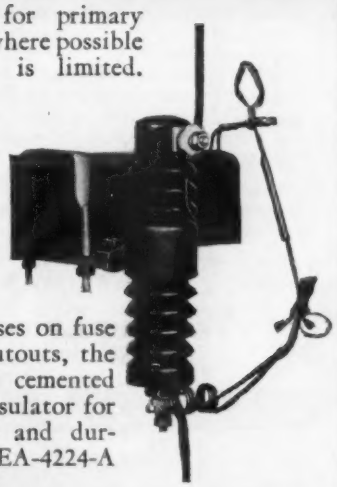
Compare each with its field for reliability, performance and flexibility of application!

OPEN-TYPE, DROP-OUT

This is the first "bird-proof" cutout in the open-type drop-out field. The mounting support is cemented into the one-piece solid insulator in the *opposite side* from all live parts—minimizing possibility of bird or animal blowing a fuse by touching a live part and the mounting at the same time. Note the closely coupled fuseholder which can be removed or replaced easily with standard switch stick.

FLIP-OPEN

A low-cost cutout for primary fusing of rural lines where possible short-circuit current is limited. Like the open-type drop-out cutout the Flip-open cutout is virtually "bird-proof." Double-wedge silver-plated contacts grip the fuse link cable. Helical-wound springs retard vibration stresses on fuse link. Like all G-E cutouts, the mounting support is cemented into the porcelain insulator for exceptional strength and durability. Bulletin GEA-4224-A gives details.



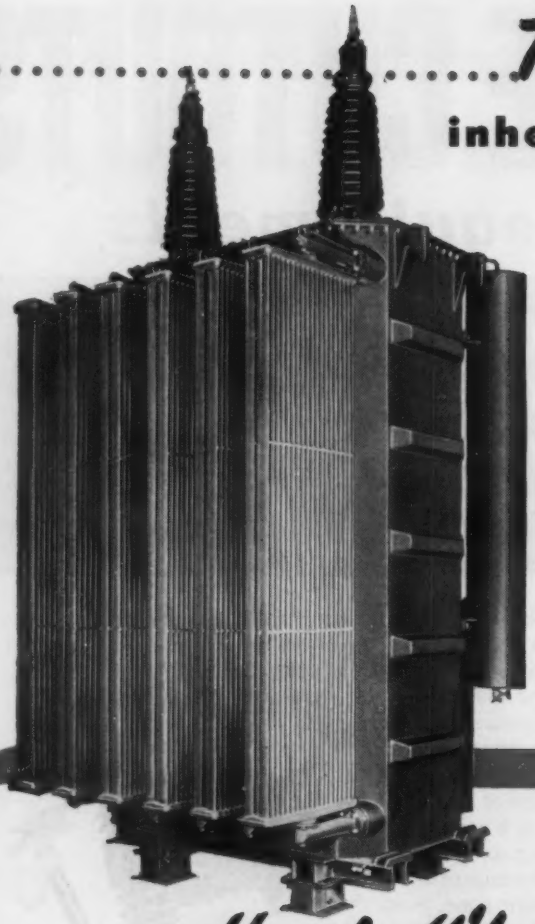
GENERAL ELECTRIC

406-22

The HIGH QUALITY

inherent in Wagner Transformers

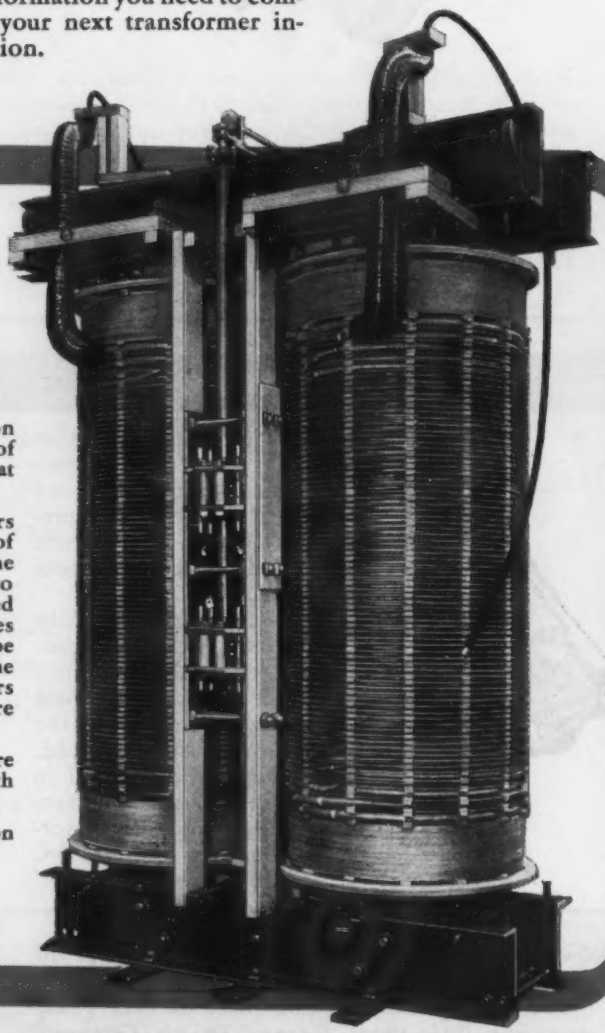
assures Unfailing Service



Wagner Power Transformers are transformers with a reputation for Quality—established through more than fifty years of service to the power industry. During this time Wagner has consistently maintained a policy of always utilizing the latest developments in transformer design, materials, and processes of manufacture. As a result of this policy, Wagner Transformers have always given efficient, dependable service with minimum maintenance.

Wagner maintains twenty-nine branch offices, located in principal cities, for quick, convenient service and advice. These offices are manned by trained field engineers who will gladly give you the information you need to complete your next transformer installation.

...Here's Why!



Meticulous attention to even the smallest details of construction are responsible for the long life and dependable operation of Wagner transformers. Some of these details are pictured at the right.

All coils are separated from each other by pressboard washers and generous oil ducts. Buffer coils at the top or line-end of the stacks are heavily insulated to absorb the impact of line disturbances. A large number of radial spacers are used to produce substantial coil assemblies which are securely clamped between steel rings, reinforced by the structural steel end plates and designed to withstand the distorting forces which may be caused by short-circuits on the line or distribution system. The out-going leads are covered with more than a hundred layers of varnished muslin to insulate them from the tank and core structural parts.

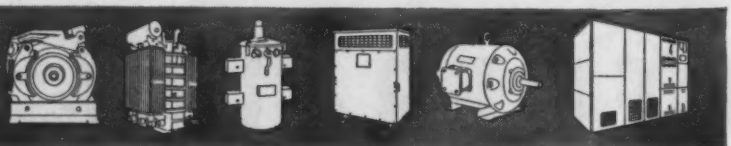
The snap-action tap changers are rigidly mounted and are operated from outside the tank. A weather-proof cap with provision for padlocking protects the adjustable head.

The complete story of Wagner Power Transformer construction is told in Bulletin TU-181. Write for your copy today.

Wagner Electric Corporation
6381 PLYMOUTH AVENUE, ST. LOUIS 14, MO.

Wagner Electric Corporation EST. WE 1891

Consult Wagner Engineers on All Transformer Problems



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL AND AUTOMOTIVE PRODUCTS

T48-5

NATIONAL ELECTRIC

EZ Numbers to Remember

- Wide, Flat Cable Stops
- Easily Inspected Anti-Short
- One-Piece Stamped Steel Body
- Sure-Grip Bond
- Electro-galvanized

Cat. No.	FITS SIZES SHOWN					
	Armored Cable	Armored Lead Cable	Lamp Cord Plain	Flexible Conduit	Ovalflex	Bare Armored Ground Wire
2222 EZ	14-1 12-1 10-1 8-1	14-1 12-1 10-1	18-2 16-2 14-2	5/16"	14-2 12-2	8-1 6-1 4-1
2163 EZ	14-2 12-4 14-3 10-2 14-4 8-1 12-2 6-1 12-3 4-1 2-1	14-2 14-3 12-2 12-3 8-1 6-1 4-1		5/16" 3/8"		
2165 EZ	10-2 10-3 10-4 8-2 2-1	14-4 12-2 12-3 12-4 10-2 10-3				
2166 EZ	10-4 8-2 8-3 8-4 6-2	10-2 10-3 10-4 8-2 8-3		1/2"		

AVAILABLE NOW THROUGH LEADING ELECTRICAL WHOLESALERS!

ECONOMICALLY PRICED!

COMPLETELY APPROVED!

MADE TO THE WIREMAN'S SPECIFICATIONS!

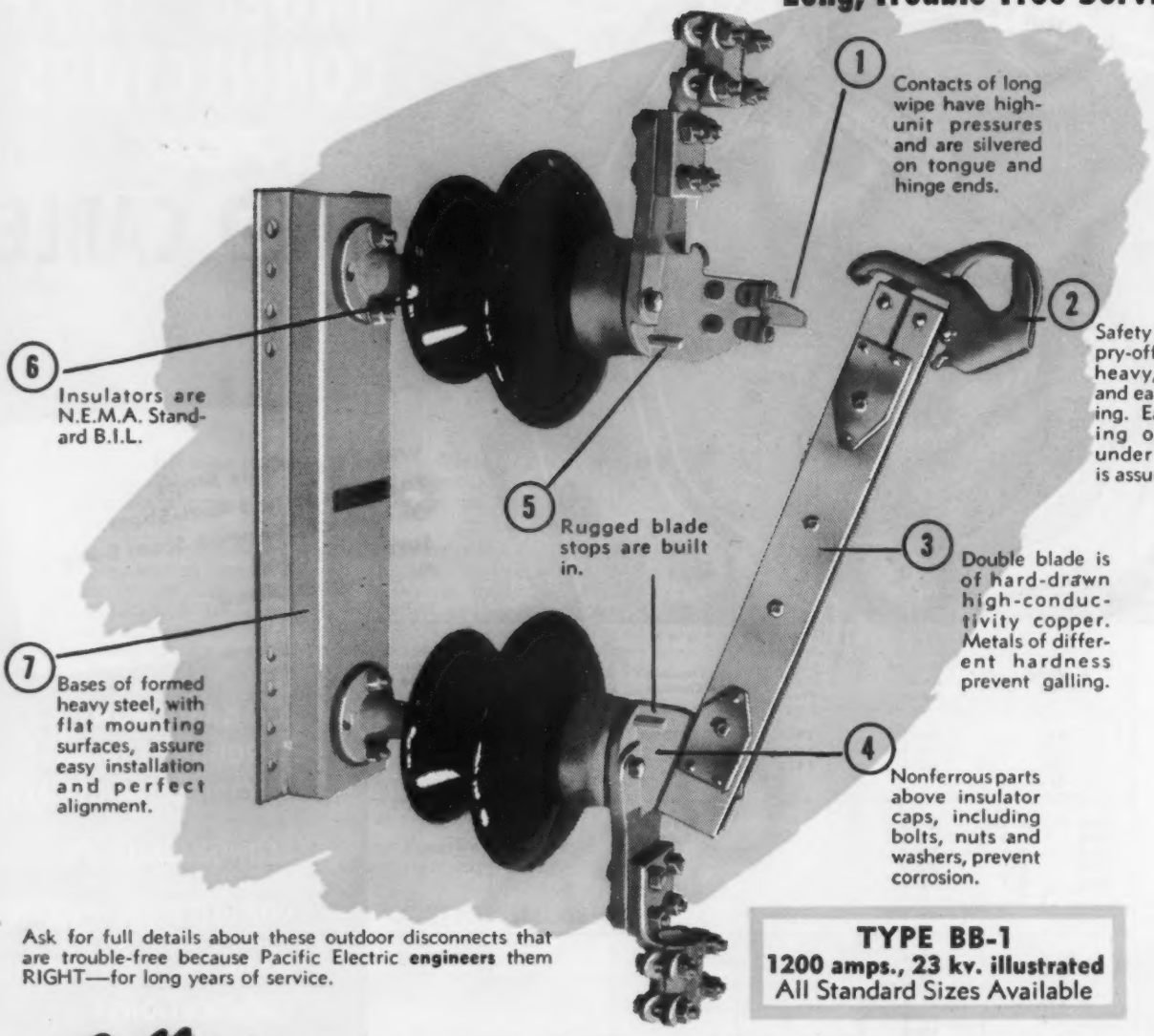
NATIONAL ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES CABLES

National Electric Products Corporation
Pittsburgh 30, Pa.

OUTDOOR DISCONNECTS

Open them with Ease and Slam them Closed

PACIFIC ELECTRIC
Engineers them RIGHT for Long, Trouble-Free Service



1. Contacts of long wipe have high-unit pressures and are silvered on tongue and hinge ends.
2. Safety latches of pry-off type are heavy, positive and easy operating. Easy opening of switch under thick ice is assured.
3. Double blade is of hard-drawn high-conductivity copper. Metals of different hardness prevent galling.
4. Nonferrous parts above insulator caps, including bolts, nuts and washers, prevent corrosion.
5. Rugged blade stops are built in.
6. Insulators are N.E.M.A. Standard B.I.L.
7. Bases of formed heavy steel, with flat mounting surfaces, assure easy installation and perfect alignment.

Ask for full details about these outdoor disconnects that are trouble-free because Pacific Electric **engineers** them RIGHT—for long years of service.

TYPE BB-1
1200 amps., 23 kv. illustrated
All Standard Sizes Available

Call **PACIFIC ELECTRIC MFG. CORPORATION**
5815 THIRD STREET, SAN FRANCISCO 24, CALIFORNIA • P. O. BOX 419, GARY, INDIANA

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G. B. KIRKWOOD, 437 S. Hill St., Los Angeles 13, Calif.
J. E. REDMOND CO., 625 W. Madison St., Phoenix, Ariz.
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PIERCE G. FREDERICKS, 90 West St., New York 6, N. Y.
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C. C. MUSGROVE, 506 Southland Bldg. Annex, Dallas 1, Texas
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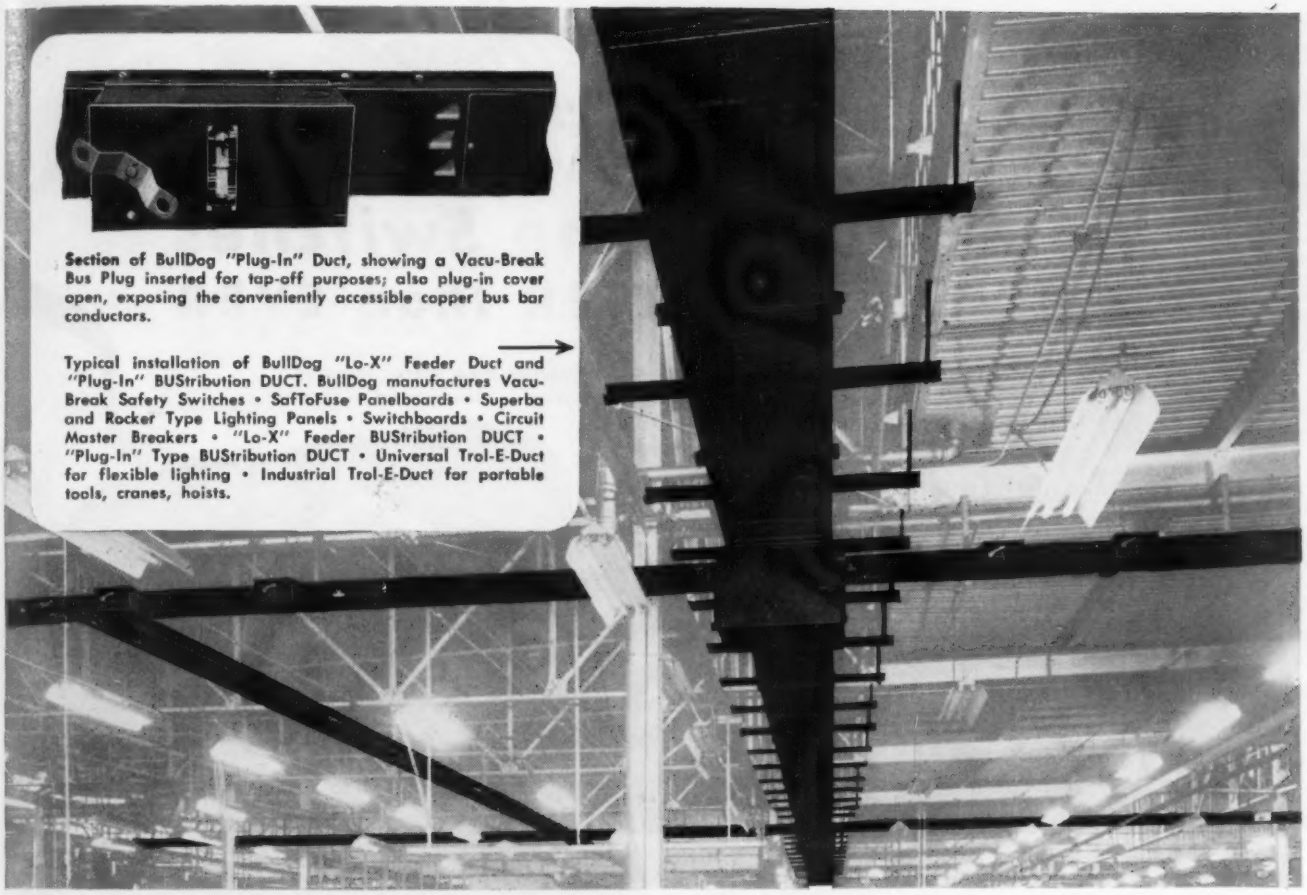
L. C. HARDIE, P. O. Box 1491, Des Moines 6, Iowa
WILLIAMSON & WILMER, INC., 617 Mutual Bldg., Richmond 19, Va.

Other Representatives in Principal Cities



Section of BullDog "Plug-In" Duct, showing a Vacu-Break Bus Plug inserted for tap-off purposes; also plug-in cover open, exposing the conveniently accessible copper bus bar conductors.

Typical installation of BullDog "Lo-X" Feeder Duct and "Plug-In" BUStribution DUCT. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panelboards • Superba and Rocker Type Lighting Panels • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution DUCT • "Plug-In" Type BUStribution DUCT • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, hoists.

A power system that thinks of every angle

. . . and we mean *all* the angles.

Expensive angles like machine layout changes, maintenance, unnecessary power outages, safety hazards, lack of salvability. Did we miss one? No matter. With a BullDog BUStribution system you are covered even on hidden-cost items.

Take machine layout changes: With BullDog "Plug-In" BUStribution DUCT, moving a machine is almost as simple as moving a table lamp to a different outlet. Remove the plug . . . move the machine . . . reconnect. No turning off the power. While you move one machine, all the others still produce.

Pays off again and again

Or look at it from this angle: Maybe you want to change the whole plant set-up. This system thinks of that, too. Both BullDog Ventilated "Lo-X" Feeder Duct and "Plug-In" Duct for Branch Circuits can be taken down, moved, and reinstalled anywhere in your plant . . . without scrapping a part. This investment makes good over and over again.

Another costly angle in any plant is that of *power losses*. BullDog "Lo-X" Feeder Bus Duct, with its exclusive "paired-phase" bus bar arrangement, keeps voltage up . . . operating costs down. Natural ventilation, plus the paired-phase principle, increases current carrying capacity, reduces temperature rise, and increases the life of the system.

Learn more about these and other angles so completely covered by this modern electrical distribution system. Call your local BullDog Field Engineer. He can show you an installation of BullDog BUStribution DUCT in your own locality.

BullDog's Field Engineers welcome the chance to sit in on planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation and maintenance costs, as well as highest efficiency and reliability in actual operation. Why not take advantage of this pre-building service?

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN — FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N. E. Sixth Avenue Tel. Garfield 2844
Portland 12, Oregon

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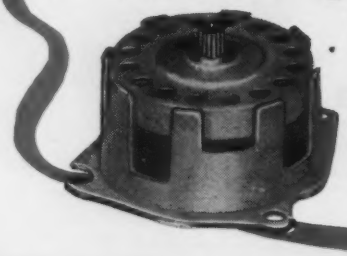
Mullenbach Electrical Manufacturing Co.
2300 East 27th Street Tel. Jefferson 2224
Los Angeles 11, Calif.

For Automatic Lighting Control

SANGAMO

Heavy-Duty Time Switches

Now BETTER than EVER



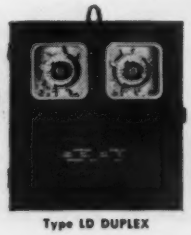
This new Sangamo-developed hysteresis type motor features greater torque . . . long-life lubrication . . . low speed — your assurance of *better performance* in automatic lighting control.

NEW MOTOR
ATTRACTIVE CASE
SHORTER INTERVALS

A new gasket sealed, pressed-steel case, modernly styled and finished in gray enamel; and closer time limits between settings which permit a wider range of applications are additional improvements that make these automatic servants better than ever. Sangamo improved time switches are now ready for immediate delivery.

Type LY TWO CIRCUIT

ASTRONOMIC DIAL



Type LD DUPLEX

The new construction is also available in the complete synchronous-motor-operated line of Sangamo Time Switches, including socket and astronomic types.

Type L (Synchronous)

This switch and the Type W Synchronous Carryover Switch (not illustrated) are the two new basic units in the Sangamo line. They can be adapted to a wide range of lighting applications.

Bulletin 1060N gives Complete Information and Prices . . . Write Today!

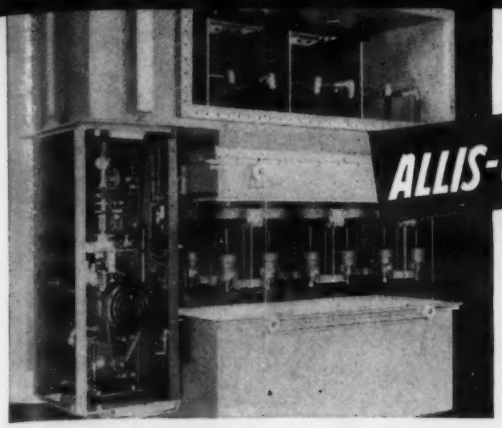
SANGAMO
ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

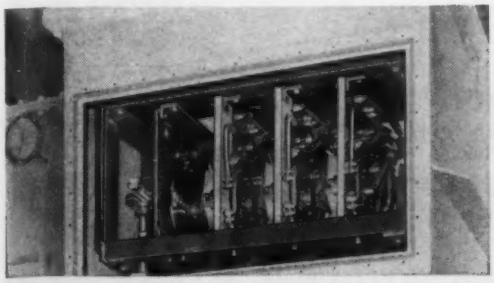
SANGAMO

BT4014

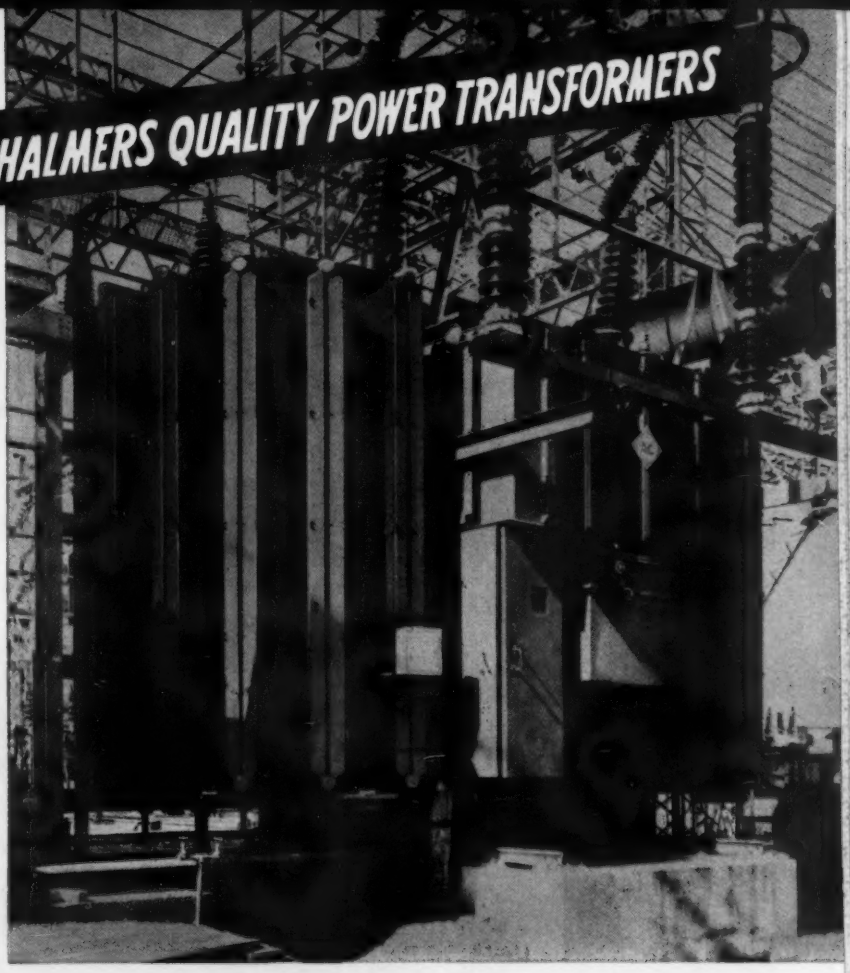
ALLIS-CHALMERS QUALITY POWER TRANSFORMERS

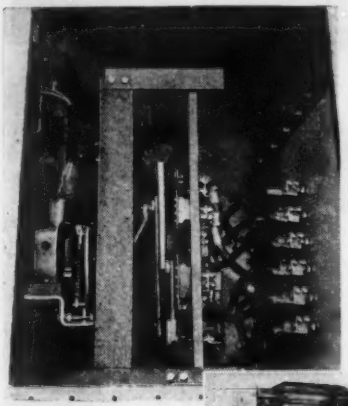


MAKING LOAD RATIO CONTROL equipment is precision work — requires skill, balance, inspection. Of several types A-C builds, above is type TLB. It provides dependable regulation for largest power transformers built.

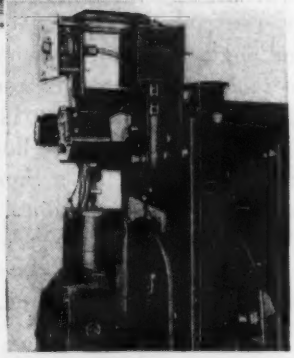


NEXT IN LINE is the type TLK load ratio control. Picture above shows assembly of the equipment and liberal design of rotary breaker that assures long, trouble-free service.





"Tailor-Made" Load Ratio Control



LRC for medium size transformers is type TLH. Mechanism shown provides ± 10% regulation for a 5000 kva single phase Allis-Chalmers power transformer.

SMALLER POWER TRANSFORMERS use same mechanism, type TLF, as Allis-Chalmers Step-Type Feeder Voltage Regulators. A-C LRC mechanisms are built for long life—backed by years of pioneering experience. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

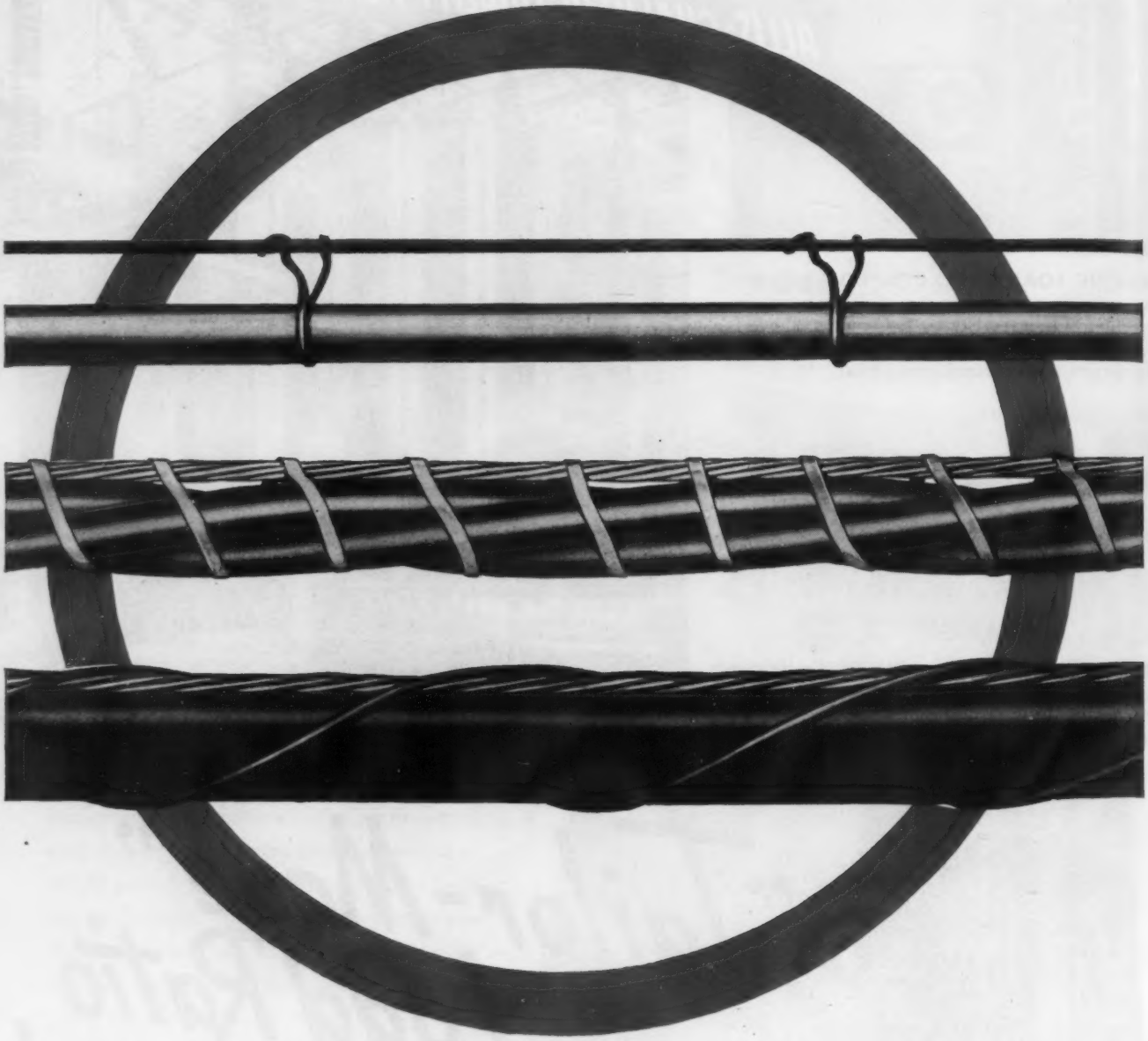
Regulates over 8,000,000 kva of U. S. power today . . . provides custom-engineered regulation under load — on Allis-Chalmers power transformers from 1000 kva and smaller to the largest built!

A 2408

ALLIS-CHALMERS A-C MILWAUKEE

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment From Generation Through Utilization



Illustrated are three methods of supporting aerial cable — the conventional messenger and ring, the self-supporting, and the new method in which the cable is lashed to the messenger in the field and known as the "Spinner" method. All three are described and illustrated, their advantages set forth in a new catalog which we issued recently. We urge you to send for it today. We feel certain that the cost figures in the catalog will give you information you should have at hand.

There is just one important thing to remember regardless of the method of support — the cables are the important part of your aerial system. It's the sound engineering and the proven long, economical service life of Simplex Aerial Cables that have made them standard on so many public utility systems. Before you decide how you will support your aerial cables, let a Simplex cable engineer help design your new cables. He is well qualified to consider the various problems you must solve. You can depend on his recommendations for cable with long, trouble-free life.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Today's biggest range feature...

the Monarch *Stoopless Oven!*

All women who buy electric ranges are not the "perfect 36's" you see in the fashion ads! In fact, quite the contrary! Hence, to Mrs. Average Homemaker, a *stoopless* surface oven commands immediate attention. When she is shown that most of her meals can be prepared on the top of her range — that all she has to do is lift the cover and there's her food — no stooping, no bending — your prospect usually proceeds to close her own sale.

MONARCH MALLEABLE RANGE CO.
3998 Lake Street Beaver Dam, Wis.

dard size oven for quantity roasting or baking — or when O different oven temperatures are needed simultaneously.

Monarch
ELECTRIC ROASTER RANGE
Since 1896

For the first time ever!

YOUR CUSTOMERS CAN GET ALL THE G-E FLUORESCENT LAMPS THEY WANT!

NO need to wait any longer! Now your customers can get all the G-E fluorescent lamps they want.

NOW'S THE TIME to help them fill those empty sockets, replace blackened, burned out tubes and go ahead with plans for lighting modernization.

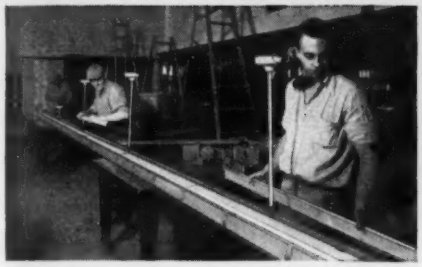
FOR THE FIRST TIME since General Electric introduced this sensational new light source ten years ago, production has at last caught up with the tremendous demand.

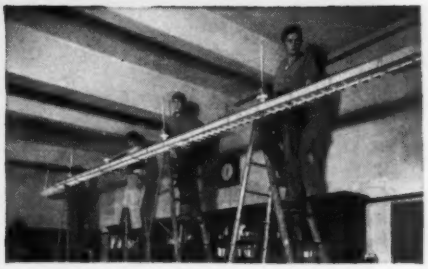
NEW FACTORIES now in operation are turning out G-E fluorescent lamps by the millions—all manufactured to those high standards of quality that have made G-E the first choice of buyers everywhere. (Only slimline and circline are still scarce.)

WE'RE TELLING YOUR CUSTOMERS the good news with ads in leading business and consumer magazines and over the air on G-E Lamps' popular radio show, "What's My Name?" Why don't you tell them, too? On every lighting job, always recommend...

G-E LAMPS

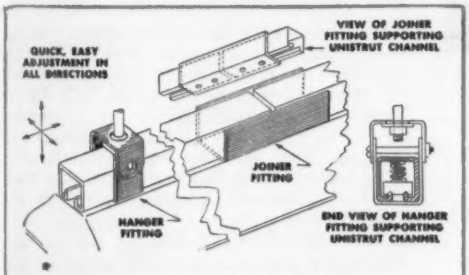
GENERAL ELECTRIC





Photographs illustrate the ease and speed with which fixtures are assembled to Unistrut at normal working height, then raised as one unit for suspension. Three minutes after picture at extreme right was taken, installation had been completed.

Installed by Wadeford Electric Co., Chicago, at Oak Park Township High School, Oak Park. Consulting Engineers—Neiler, Rich & Bladen, Chicago. Fixtures by Curtis Lighting Inc., and F. W. Wakefield Brass Co.


QUICK, EASY ADJUSTMENT IN ALL DIRECTIONS
VIEW OF JOINER FITTING SUPPORTING UNISTRUT CHANNEL
JOINER FITTING
HANGER FITTING
END VIEW OF HANGER FITTING SUPPORTING UNISTRUT CHANNEL

New Unistrut Hanger Fitting and Joiner Fitting for quick, easy fixture hanging. Eliminates drilling—allows extreme freedom of adjustment in all directions. A single bolt securely locks clamp to Unistrut.

Send for Pamphlet No. 92
"Unistrut Method of Supporting Fluorescent Lighting Fixtures"

UNISTRUT PRODUCTS COMPANY
1013 W. WASHINGTON BOULEVARD
CHICAGO 7, ILLINOIS

Name_____

Firm Name_____

Street_____

City_____ State_____

4 reasons why "UNISTRUT" ALL-PURPOSE METAL FRAMING

makes fixture hanging easier and results in a better installation

1 FEWER HANGER RODS

Hanger rods may be spaced as far as 15 feet apart, resulting in lower costs and a better appearing installation.

2 PERFECT ALIGNMENT

Unistrut is perfectly rigid and straight—results in true alignment of fixtures. Standard lengths 10 and 20 ft.

3 FASTER, EASIER INSTALLATION

Entire run of fixtures can be quickly assembled to Unistrut *before* raising completed unit to ceiling for suspension.

4 COMPLETELY FLEXIBLE

Hangers may be installed at *any* point along Unistrut continuous slot channel. Allows greater adjustment—easier alignment and leveling of fixtures.

Unistrut has hundreds of other uses—completely adjustable and 100% re-usable!

ALL PURPOSE UNISTRUT METAL FRAMING

Representatives in all Principal Cities

PRODUCTS COMPANY

1013 W. WASHINGTON BLVD., CHICAGO 7, ILL.

TOUGH JOINTS!

Engineers of a large electrical power utility expect joints of new underground cable to last 30 to 40 Years.

Two half laps of No. 33 "SCOTCH" Electrical Tape with Vinyl Plastic backing protect the crimp splice. The splice is then built up to full cable diameter with No. 23 "SCOTCH" Electrical Tape with Polyethylene backing, after which it is given a final impervious, abrasion resistant jacket of No. 33 "SCOTCH" Electrical Tape with Vinyl Plastic backing. In a series of tests, one such splice stood 70,000 volts for 45 seconds.

For dependable dielectric strength, abrasion resistance and a tight seal against water, oil and acids you can always count on No. 33 "SCOTCH" Electrical Tape with Vinyl Plastic backing. The superior stretchability of "SCOTCH" Electrical Tape allows it to be pulled down tight and to conform to irregular surfaces.

If you would like to know how others are making better cable splices—faster—and saving money—call or write us today, a "SCOTCH" Tape engineer will call and give you the entire story.

No. 33

SCOTCH BRAND Electrical TAPE

ANOTHER 3M COMPANY PRODUCT

Made in U. S. A. by **MINNESOTA MINING & MFG. CO.** St. Paul 6, Minn.

LETTERS TO THE EDITOR

Wrong Company

To the Editor:

About a month ago in your ELECTRICAL WEST you assigned me to the Portland General Electrical Co., to which I have no objections at all because I consider them a grand outfit.

However, in your issue of July 1948, on page 70 you have again assigned me to the Portland General Electric Co., along with Mr. Snedden of the steam heat division here in Spokane. Still, neither of us objects, but it occurs to me that the comparative heating costs shown on that page would probably apply better in Spokane than they would in Portland, as I understand there is considerable difference in the fuel prices in the two places.

Should you receive any comments on this table, this will probably explain any criticism that you might get.

G. H. PIKE,
Rate Engineer,

The Washington Water Power Co.,
Spokane, Washington

For Answer See Page 80

To The Editor:

(This is a personal letter)

This is to protest the snide and entirely unwarranted little piece on page 112 of your May 1948 issue entitled *Water Over the Dam*, in which your publication was presumptuous enough to criticize the multi-purpose operation of Shasta reservoir, about which it evidently knows less than nothing. The piece, which has only recently come to my attention, claims that a generating unit lay idle at Shasta power plant "all during March, because USBR officials contended the water would be needed for summer irrigation," as a result of which '94,000 acre-ft. of water was spilled and 38 million kwh. of energy wasted.' As watermaster of the Central Valley Project, but writing as a private individual, I hereby inform you that this statement is factually incorrect and shows a very simple-minded grasp of the purposes and operation of Shasta reservoir.

The third generating unit at Shasta was not ready to go on the line until April 13—two days before it did go on the line. However, it would not have been utilized until April 15 even had it been ready for operation in February. During February and March, although your publication seems to be unaware of the fact, there was every indication of a prolonged drought in northern California. The immediate crisis was one of power supply, to be sure; but every responsible agency in the state was more anxiously concerned with the future water supply—for irrigation and domestic use as well as for power production—not simply the outlook for the summer and fall of 1948, but the prospect for 1949 as well.

Our aim in the management of Shasta was, primarily, to achieve a full reservoir, in order to contribute to the fullest extent possible in whatever emergency should be-

(Continued on Page 60)

Specify-

PYLE-NATIONAL FLOODLIGHTS

for Permanent Heavy-Duty Floodlighting

10"-12"-14"-16"-18"-23"
for 100 to 2000 watt lamps

PORTABLE
10"-12"-14"-16"
100 to 1000 watts

FLUSH—10" for Pit or Subway Wall or Ceiling
100-150-200 watts

SHORT RANGE—10"-12" for Wall Mounting
100-150-200 watts

Dependable Floodlighting with Minimum Maintenance

Pyle-National floodlight equipment is designed and constructed to withstand the most severe operating conditions. Complete range of types and sizes are available.

RUGGED cast aluminum housings with tight sealing doors and door glass joints—positively dust proof and moisture proof—give maximum protection to reflectors and lamps and reduce cleaning and other maintenance to an absolute minimum.

STRONG, galvanized cast iron bases and brackets of many types are provided for simple mounting and accurate adjustment in all locations.

ADVANCED DESIGN of the carefully molded and highly polished reflectors and lenses insure the highest optical efficiency—thoroughly annealed for maximum toughness.

Write for catalog 2100 giving complete information.

The services of our trained and experienced floodlighting specialists are available at all times to advise and assist in installation problems.

SINCE 1897

THE PYLE-NATIONAL COMPANY

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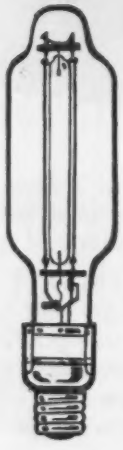
Westinghouse Lamp Developments Like These Help You Sell Planned Lighting



WESTINGHOUSE manufactures many types of mercury vapor lamps, in sizes from 100 to 3000 watts, for general lighting, floodlighting, street lighting, photochemical, photographic and searchlight service. Three recent developments in this field are the 400-, 1000-, and 3000-watt mercury lamps described below.

1000-WATT MERCURY VAPOR

This quartz mercury lamp (A-H12) is "cool burning"—radiates only one-third as much heat as incandescents of equal wattage. Twelve of these lamps were installed recently on the set of the DuMont television network's Washington, D. C. station WTTG. Watt for watt, they provide more than twice as much light as was obtained previously with incandescent spot and floodlights. In addition to these advantages, the lamp's blue-green-white light matches the color response of the Iconoscope, the television camera's "eye", to help produce a high quality television picture.

400-WATT MERCURY VAPOR

This 400-watt quartz mercury vapor lamp (E-H1), together with the Westinghouse OV-20 Luminaire, is providing vastly improved and more efficient illumination on streets and highways. Other recommended applications are for general lighting and floodlighting.

3000-WATT MERCURY VAPOR

Westinghouse Contributes to Low Cost Photochemistry

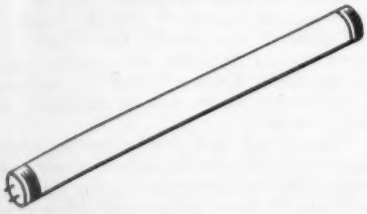
Westinghouse engineers have also developed many types of lamps for important fields of application other than lighting. Illustrated here is the 3000-watt (B-H9) mercury vapor lamp designed for use in photochemical processes in industry. Its high output and long life make it an economical, high powered source of near ultraviolet radiation, which is of great value in blueprinting and in speeding up chlorination processes and similar chemical reactions.

For complete product information call your Westinghouse Lamp representative or write nearest Westinghouse Lamp District Office:

10 High St., BOSTON; 2260 Peachtree Industrial Blvd., CHAMBLEE, GA.; 20 N. Wacker Drive, CHICAGO; 40 Wall St., NEW YORK; 3001 Walnut St., PHILADELPHIA; 419 Wood St., PITTSBURGH; 410 Bush St., SAN FRANCISCO; 411 North 7th St., ST. LOUIS.

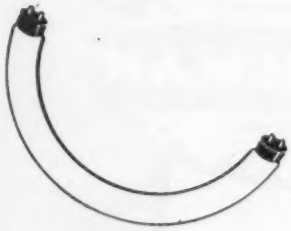
You can be Sure

NEW WARM WHITE FLUORESCENT COLOR



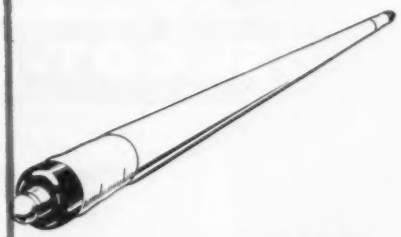
To meet the need for a fluorescent color which blends well with incandescent lamps, Westinghouse engineers developed a new high efficiency color called Warm White. It is available in the regular 20- and 40-watt sizes for use in homes, stores and other places where the familiar appearance and color effect of incandescent lighting is desired. The new Warm White color provides the familiar homelike atmosphere of incandescent lighting with the coolness, comfort and economy of fluorescent lighting.

WESTINGHOUSE CIRCLARC LAMP



The 18-watt CIRCLARC Fluorescent Lamp is a functional, decorative and economical addition to the familiar line of straight and round fluorescent lamps. Used singly or in multiple arrangements, this new half-round shape provides interesting new possibilities for unique lighting designs. Because two CIRCLARCS can be connected to form a circle, these lamps can be used in floor and table lamps. They are also applicable to pin up lamps, bed lamps and distinctive ceiling fixtures. Their application fits into all fields of lighting—residential, commercial and industrial.

NEW SLIMLINE GERMICIDAL STERILAMP*



Many years of research, engineering, and field test work have gone into the development of this new germicidal lamp. Its improved performance and greater output throughout life makes possible a 50% saving in the cost of protection. It has higher intensity; produces more ultraviolet than any other lamp on the market. New possibilities of air disinfection are anticipated for the future by the use of this high-output longer-life lamp developed by Westinghouse.

*Reg. U. S. Pat. Off.

NEW, COMPACT, 75-WATT SPOT AND FLOOD LAMP

This completely self-contained lamp with hermetically-sealed reflector meets the need for a lower wattage, smaller bulb lamp for interior lighting applications where limited space is available, or where small inconspicuous lighting units are desired. It is of mushroom shape, designed for small areas, and fits any medium screw socket. Ideal for many varied applications in home, store, office and factory.

HARD GLASS, 300-WATT REFLECTOR SPOT AND FLOOD

This hard glass (special service) lamp is designed for use out-of-doors and other places where contact of water with the bulb might cause the glass ordinarily used in such lamps to crack. The 300-watt R-40 heat-resisting glass bulb used with this lamp fulfills the need for a wide variety of outdoor spot and floodlighting applications.

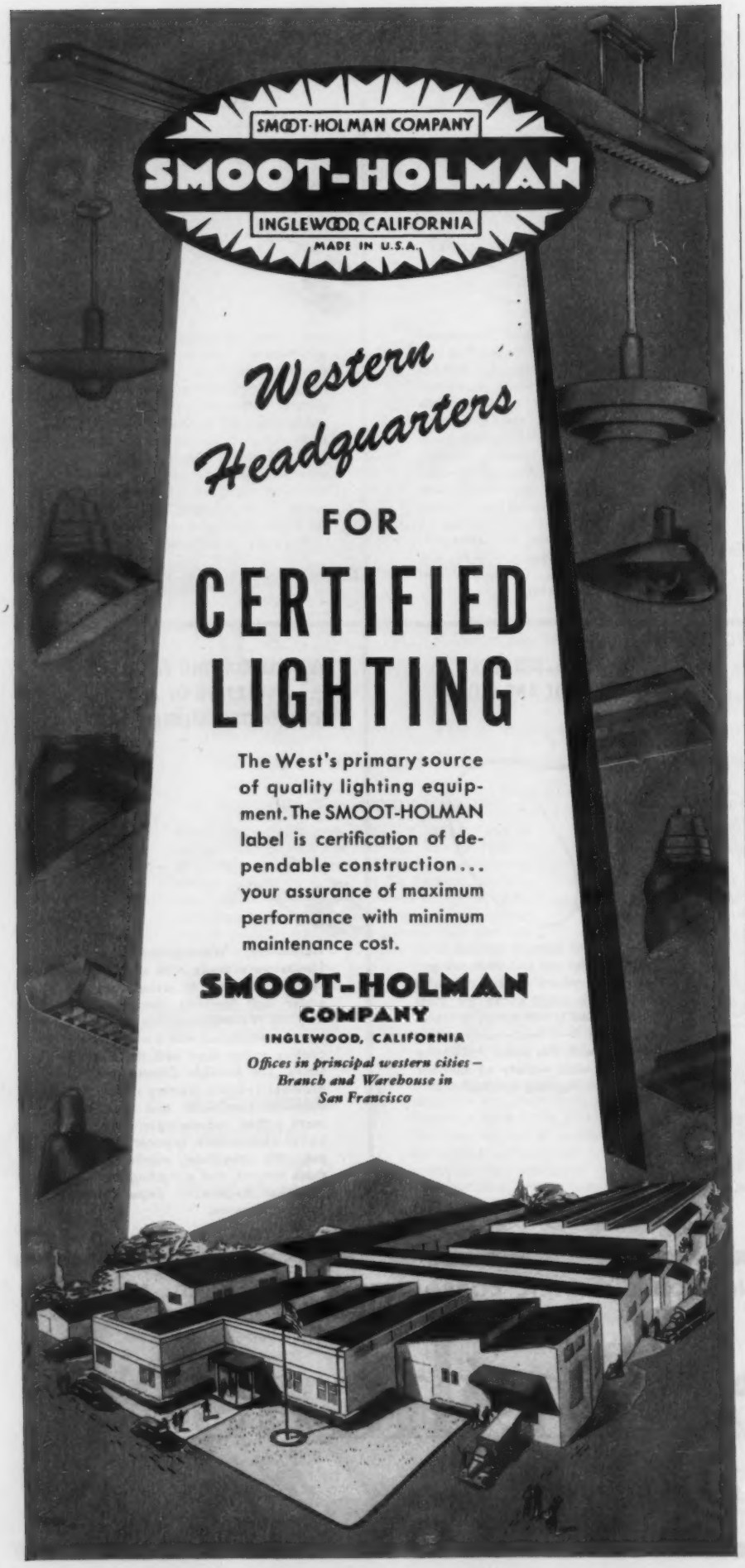
INVISIBLE COATING FACILITATES STARTING OF ALL WESTINGHOUSE SLIMLINE LAMPS

Heretofore, Westinghouse Slimline Lamps were made with a thin gray "starting stripe" to assure starting under high humidity conditions. Today, all Westinghouse Slimline Lamps are manufactured with a new Silicone coating rather than with the starting stripe. The invisible Silicone coating provides reliable starting under high humidity conditions and possesses many other advantages such as: better appearance, greater light output, the complete elimination of shock hazard, and a starting aid with a higher degree of dependability and permanence.

LAMP DIVISION, WESTINGHOUSE ELECTRIC CORPORATION, BLOOMFIELD, N. J.

if it's **Westinghouse** *Lamps*

THE NAME YOU KNOW IN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fall, and at the same time to assist the PG and E company to our maximum ability in meeting its immediate system demand. In this objective we were endorsed by the State Division of Water Resources, the State Water Resources Board, the Public Utilities Commission, the Irrigation Districts Assn., the Corps of Engineers and the Pacific Gas and Electric Co. itself. On March 4 the above named agencies were called together by the State Engineer, and at the close of a conference issued a joint statement which read, in part:

"Emergency and radical water conservation measures must be taken immediately if crop losses and damages in the Sacramento and San Joaquin valleys and other parts of the state are to be averted or even minimized.

". . . The group agreed that the problem is so critical and so important that the legislature will be requested to appropriate emergency funds to put into effect remedial measures for water conservation during the remainder of the year.

". . . It was brought out at the meeting that the outlook for summer irrigation water supply is for the lowest runoff of record on many of the streams tributary to the Central Valley."

An emergency Committee of the Sacramento River Water Users was formed by the State Engineer's office, and on March 29 the situation was still so critical that the committee issued a letter which concluded:

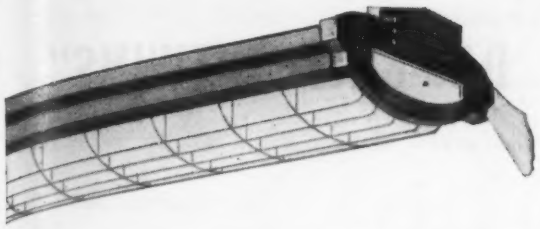
"In view of the foregoing this committee wishes to call to your attention the following: (1) A water shortage along the Sacramento River will exist in 1948. (2) A cut in this season's diversions below those of last year will be necessary. (3) A large monetary loss to growers will result unless 1947 acreages are reduced or present irrigation practices are greatly improved. (4) The close cooperation of every water user in improving irrigation practices will result in the elimination of the necessity for the imposition of compulsory regulations." This communication was signed by Horace B. Wulff, chairman of the committee, by A. D. Edmonston, assistant state engineer, and by myself.

The emphasis of the company's operation, of the Utilities Commission's ruling and of Mr. O'Brien's subsequent regimen was likewise conservation—to curtail on use in order to be able to conserve as much storage as possible to meet even more dire conditions expected later. With the company this policy was one of expediency; with the Bureau of Reclamation, however, it was required by legislative mandate. Our first and continuing obligation is to water-users, and our sole obligation in the production of hydroelectric energy at the present time is the satisfaction of our contract with the PG and E company. During the four months January through April, however, the bureau delivered better than 250% of its contract commitments to the company, as follows:

Month	Millions of kilowatt-hours	
	Contract	Delivery
January	80	94.45
February	22	68.96
March	24	73.74
April	24	139.63
	150	376.78

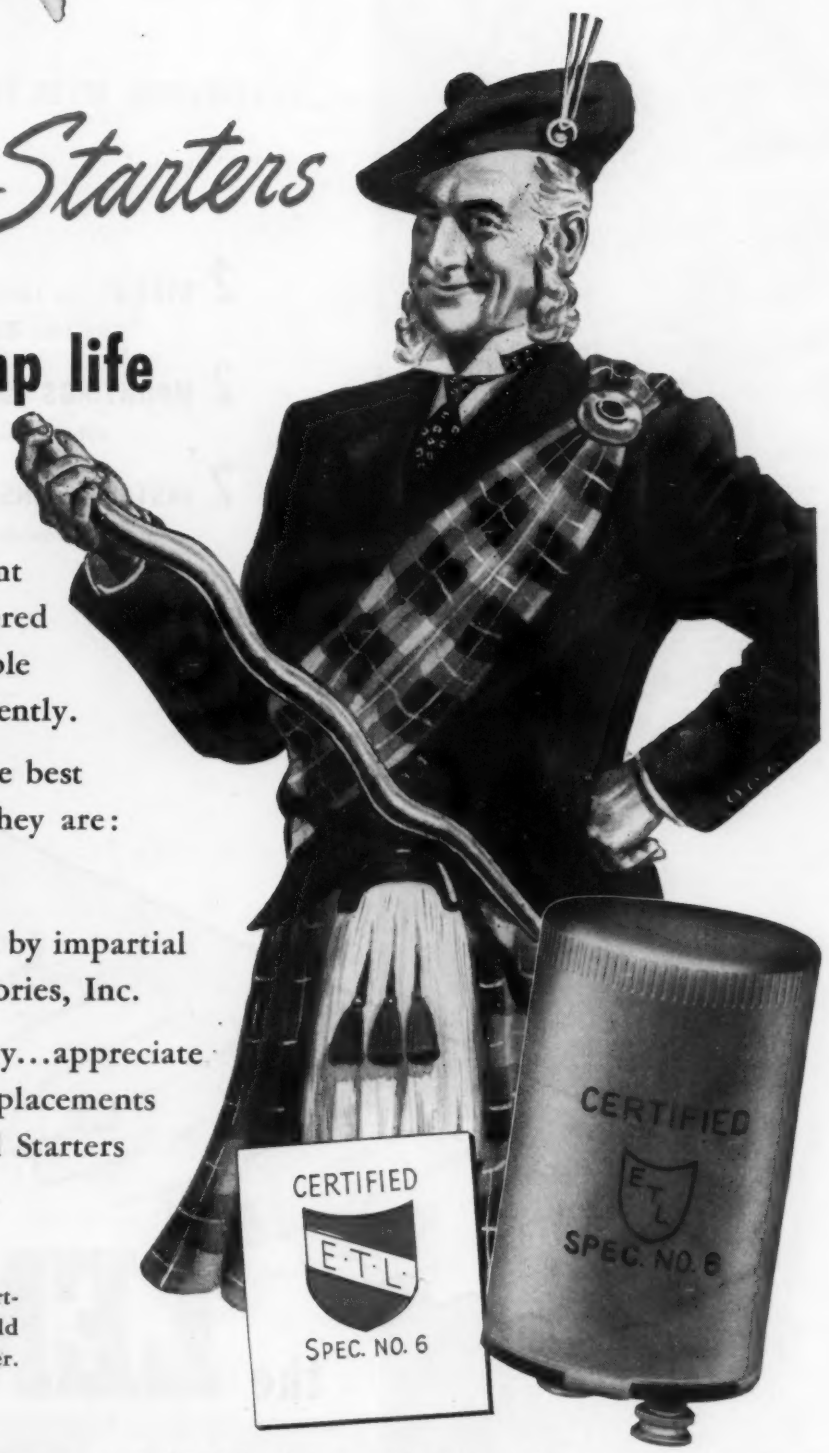
That the bureau made this assistance to the company and still achieved a full reservoir is a source of pride with me personally, and it may interest you to know that the bureau has been congratulated on its achievement in this regard. Your bit of propaganda, however, emphasizes not the achieve-

(Continued on Page 64)



Certified Starters

assure full lamp life



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Made to rigid specifications

Tested, checked and certified by impartial Electrical Testing Laboratories, Inc.

You'll quickly notice the economy...appreciate the reduced lamp and starter replacements . . . when you insist on Certified Starters in your fluorescent installations.

● To be sure you get Certified Starters, look for the Certified shield on the case and on each starter.

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Dura Electric Lamp Co., Newark, N. J.
General Electric Co., Bridgeport, Connecticut
Harvey Hubbell, Inc., Bridgeport, Connecticut
Instant Glow Starter Corporation, New York, N. Y.
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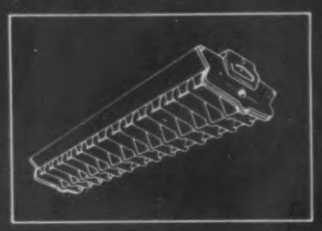

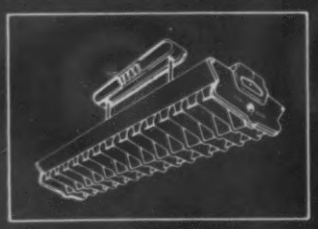

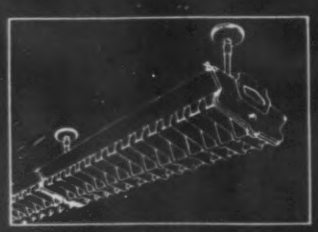

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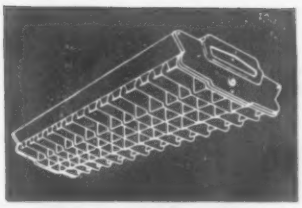
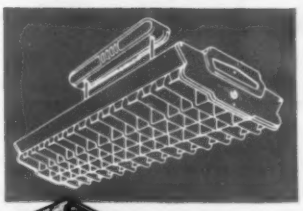
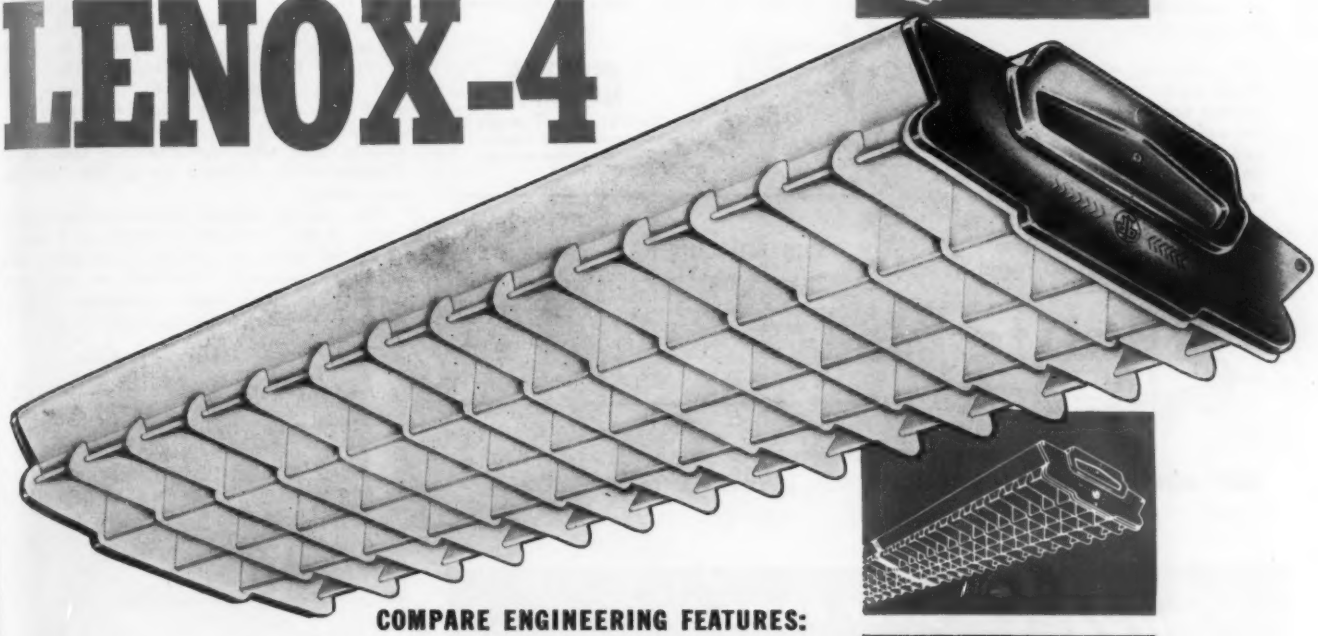
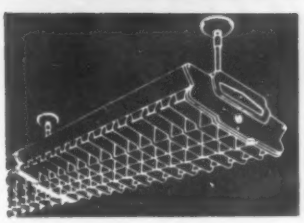




the LENOX-4





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- Wired with approved type ballasts, sockets and no-blink type starters
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May we send you Bulletin 10-E and 10-F with complete details?

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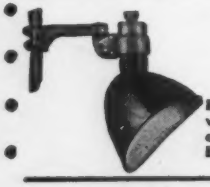

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In Bakelite and Urea Plastics, No. 204. Heavy walled brown bakelite, and of ivory urea (No. 204 I) . . . with shade holder ledge. Listed by U. L.

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Phoenix, Ariz.: H. GEORGE SHEFLER, P. O. Box 1587

ment, but the fact that April rains caused flood control releases, in excess of the carrying capacity of the turbines, to become necessary in mid-April. This, you say, represented "a black crime in any load dispatcher's book." Apparently, it will surprise you to learn that the load dispatcher is not responsible for regulation of Shasta Lake, since it is not a hydroelectric reservoir but a multi-purpose one. On the contrary, my office calls the shots on Shasta releases and I do not in the least consider that the entirely unexpected, unhoped-for April rains represent a black crime in my book.

Since evidently the publishing staff of the ELECTRICAL WEST knew all the time that there would be ample rain and that the grain crop would be saved, I assume that you all bought up large acreages of the grain lands which were being offered at 50c an acre in February and March, but which generally went unsold because the stock had been shipped out. In this case, you must now all be very wealthy men indeed, and presumably can be expected to retire shortly from what the erstwhile fishwife of Hammersmith referred to as her "present profession."

This communication is sent you for publication in the ELECTRICAL WEST, as a rectification of your prejudiced, inaccurate and damaging account. Whether or not your publication is sufficiently courageous to print it seems at least problematical.

Martin H. Blote

Sacramento, Calif.

ELECTRICAL BOOKS

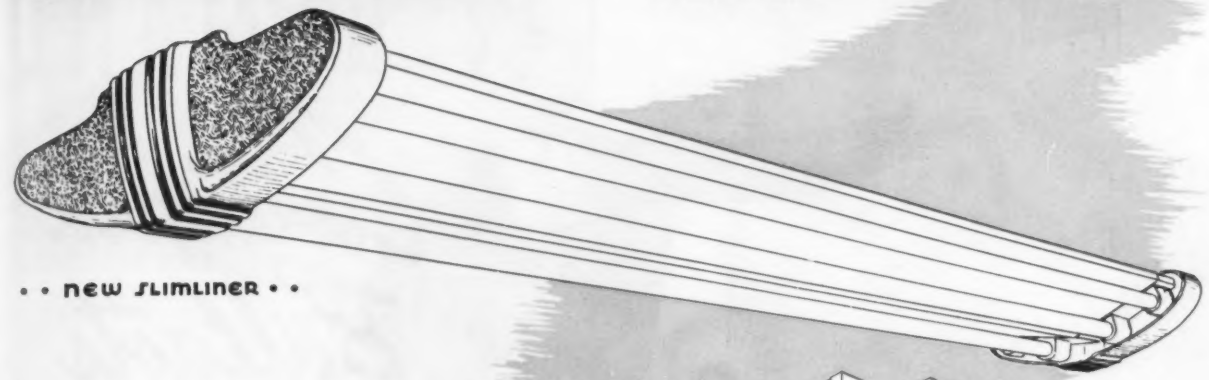
AMERICAN ELECTRICIAN'S HANDBOOK, Enlarged Sixth Edition, by Terrell Croft, revised by Clifford C. Carr, 1,773 pages, 5x7½, McGraw-Hill Co., $6.

With the addition of late practical data and circuits for use of electron tubes among its 250 pages of entirely new material and being brought up to date with the 1947 edition of the National Electrical Code, this handbook gives the electrician and the electrical contractor in one compact volume all the working information he would ordinarily use. Among other new things added are sections on amplidyne and rototrol, electronic control of motors, automatic electric drive control, synchronous controls, dry-type, transformers, copper oxide and selinum rectifiers, signal light fuses, thermoplastic insulated wires, load center industrial distribution systems, and fluorescent lamp developments. "This is a practical man's handbook," is more true than ever.

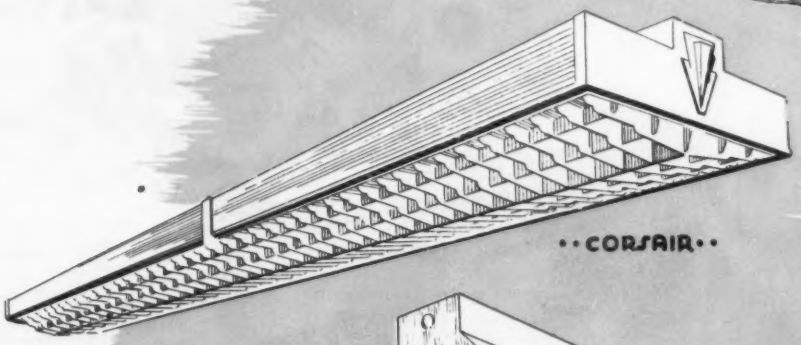
FLUORESCENT AND OTHER GASEOUS DISCHARGE LAMPS, by William E. Forsythe, and Elliot Q. Adams, both of General Electric Co., 292 pages illustrated, 6x9, Murray-Hill Books Inc., $5.

In this book two General Electric Co. physicists cover the field of the gaseous discharge lamp very thoroughly. Beginning with theories of light and radiation they go through the physicial characteristics, the basis of fluorescence and then on to descriptions of lamps, phosphors, operation, quality, and special phenomena. The book also treats of fluorescence and television, arcs and their light output and operation and even photographic flash lamps.

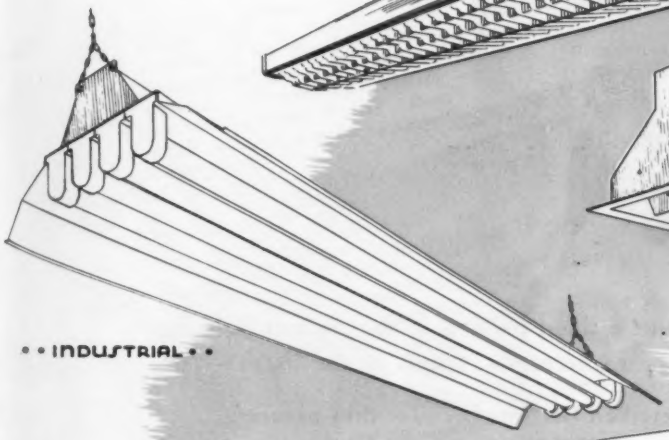
ALL-BRITE *of California* leads in SLIMLINE



• • NEW SLIMLINER • •



• • CORSAIR • •



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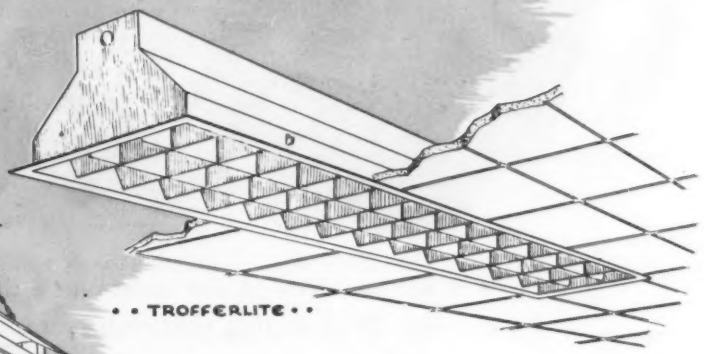

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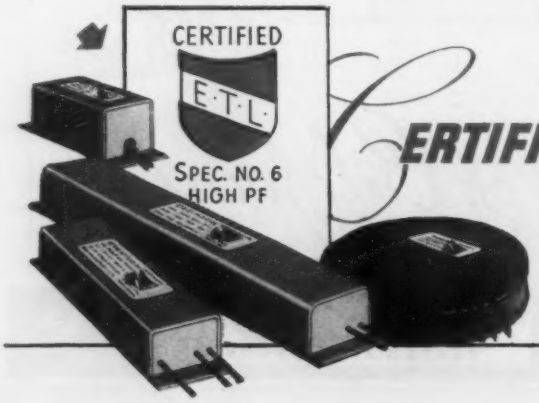
• When you demand and insist on Certified Ballasts in fluorescent lighting fixtures—you're protecting your own best interests—as well as the users'.

Everyone benefits by using Certified Ballasts because they assure . . .

Full lamp life **Rated light output**
Quiet operation **Dependable performance for fixture life**

Strict specifications control the building of every Certified Ballast—Electrical Testing Laboratories, Inc., an impartial judge, then checks and tests them. You're surer of satisfaction with Certified Ballasts.



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Makers of Certified Ballasts for Fluorescent Lighting

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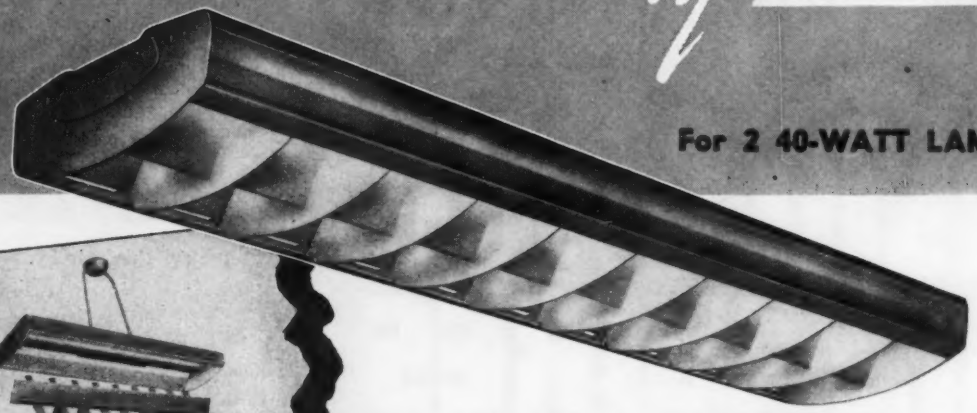
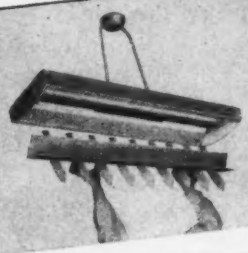
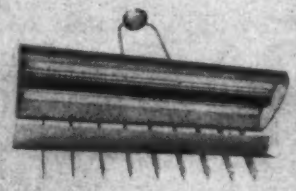


For 2 40-WATT LAMPS



Lo-Brite Finish Louvers — minimize glare, open from either side of unit and are positively "snapped" into position without the use of springs, screws or holding device. Louver hangs easily from either side or can be removed completely.

Side reflectors swivel out so that inner reflecting surface may be washed or dusted very simply.

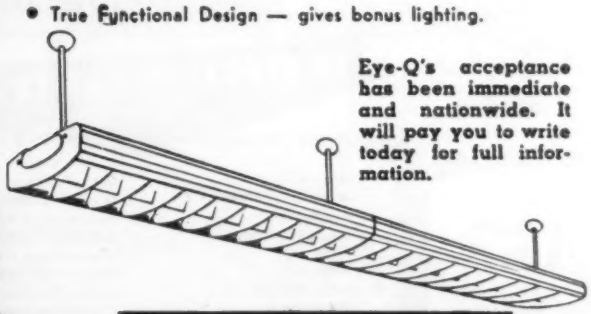


Wide wireway for easy maintenance. Sliding ballast permits use of any type hanging stem at any position along the entire unit—whether mounted individually or in continuous rows.

A NATURAL FOR SCHOOLS, STORES, OFFICES AND INSTITUTIONS

Here is the unit that conforms to the highest construction standards — has the exceptionally high lighting efficiency of 83% — yet is unbelievably low in cost! The Smithcraft Eye-Q combines economy, ease of installation, simple maintenance, beauty and efficiency. Never before have so many plus features been combined in one unit — look at just a few:—

- Exceptionally high efficiency of 83%.
- Hinged Removable Louver — opens from either side and is removable without the use of any holding device.
- Guaranteed Ballast — slides along entire unit.
- Versatile Mounting — stems can be inserted at any point on the housing.
- Swiveling Side Reflectors — permits speedy cleaning.
- Lo-Brite Louver Finish — reduces glare, gives cool, comfortable light.
- True Functional Design — gives bonus lighting.



Eye-Q's acceptance has been immediate and nationwide. It will pay you to write today for full information.

Smithcraft
LIGHTING DIVISION
CHELSEA 50, MASSACHUSETTS

IMMEDIATE SERVICE
ON ALL
YOUR MOTOR REPAIR MATERIALS AND TOOLS

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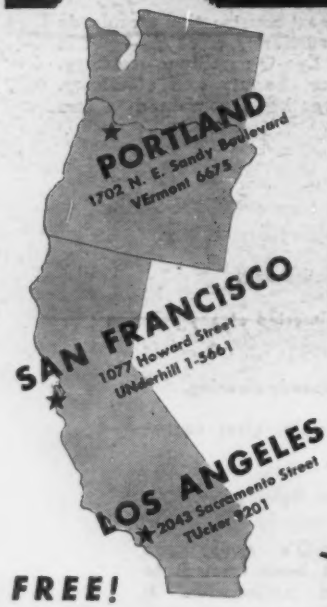

Letting IWI handle all your needs is like having a completely stocked warehouse right next door. IWI means no time wasted in waiting — no separate orders to many suppliers — no extra shipping or handling costs. Get what you want *fast,* with *one order* and *one delivery.*

All IWI repair shop items are nationally known and service proved. Every one is guaranteed to be of highest quality. Specially trained IWI field service representatives are ready to help you. Depend on them without obligation.

Call on IWI for Service!
Depend on IWI for Quality!

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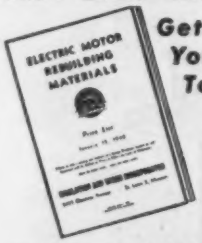
Get Yours Today!



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INSULATION AND WIRES IWI SERVICE

More than 15 years experience helping repair shops do a better, more profitable job.

PRODUCT NEWS

Two-Lamp F Unit (900)

Westinghouse has a 2-lamp fluorescent luminaire (CS-80) with matching single incandescent spotlights (SS-150) for installation individually or in continuous rows. The new fixture was designed to extend the company's Merchandiser system and is for location under balconies or for stores where lower illumination levels are needed than would be provided by continuous rows of 4-lamp fixtures. Spotlight sections may be installed where required between adjacent fluorescent units to make completely tailored rows. Construction is similar to Merchandiser units CS-160, but the new luminaires are two thirds as wide. The CS-80 is for direct mounting on ceiling.

Commercial Fixtures (901)

Companion-type commercial fixtures, the Lenox 2 and 4, have been designed by Daybrite for low-brightness ratios and easy maintenance. They are of all-metal construction; are for individual or continuous installations. For suspension-mounted continuous installations, the patented "A-J" hangers are available in two standard stock lengths. These hangers have a concealed adjustment feature which allows the line of fixtures to be leveled after installation. The Lenox-2 takes two 48-in., 40-watt fluorescent lamps; the Lenox-4, four 48-in., 40-watt lamps.

Yard Light (902)

S & M Lamp Co. has announced the Red Cap No. 1100 Yard-Lite for low-cost flood-lighting of yards, driveways, patios, shops, etc. This unit has a 14-in. aluminum reflector that takes any standard medium socket lamp. It is said to throw a wide pattern of light. Over-all length, including rigid conduit, is approximately 25-in. The mounting has one-piece socket cap and two lock nuts. No. 1100 comes with wired socket, mounting bracket and lag screws.

Residential Line (903)

Globe Lighting Products Inc. is marketing a new residential fluorescent line, the "wing-tip" series. It is headed by a kitchen and bedroom unit, available in 31- and 15-in. body length, with two lights, 20 or 40 watts. Other designs in the line are created for small library, living room, rumpus room, hall.

Spot Light (904)

Kahn Mfg. Co.'s Hi-Spot-Lite "In-line" models 3090 and "Corner" 3091 uses the Par-38 projector spot bulb, side prong, have 80° angle variation and swivel in a complete circle. Louvers are available for both models. Units are 3⅜ in. deep to match Kahn fixtures.

Wall Lamps (905)

LaSalle Lighting Products is showing new wall lamps, featuring kitchen and bedroom designs in nautical and floral motifs, military treatments, colonial and classical models.

SYLVANIA *introduced the* HANDY-5-PACK

THOROUGH, painstaking sales research on the part of Sylvania resulted in the introduction and active promotion of the HANDY-5-PACK—one of the most revolutionary merchandising ideas ever developed in the lighting industry. Sells five bulbs at once—keeps those empty sockets filled.

The HANDY-5-PACK is one of the many "firsts" introduced by Sylvania Electric, pioneer in the fields of Lighting, Radio, FM, Television and Electronics.

ALL PRODUCTS MADE BY SYLVANIA ELECTRIC CONSUME ENERGY—MORE THAN 10,000,000,000 KWH PER YEAR

SYLVANIA ELECTRIC

WEST COAST DIVISION OFFICES: LOS ANGELES, SAN FRANCISCO, SEATTLE

KLEINS

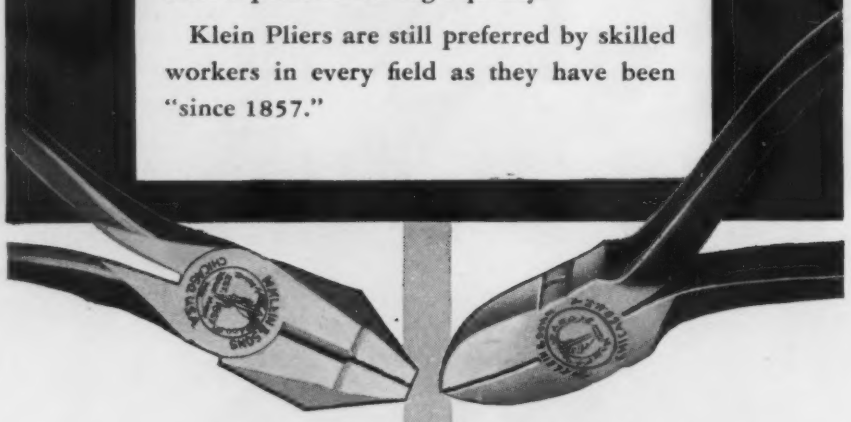
FOR MEN WHO WANT

the Best

• Ever since the first communication and power lines were strung, Klein Pliers have been the favorite tools of electrical workers.

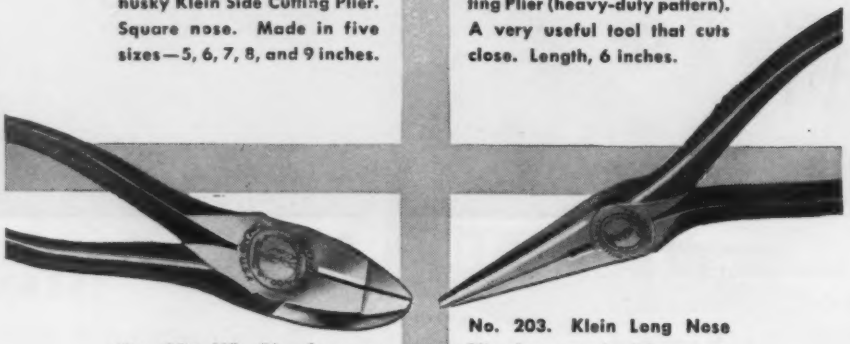
Today, Klein Pliers are made with the same exacting care that has won these tools their reputation for high quality.

Klein Pliers are still preferred by skilled workers in every field as they have been "since 1857."



No. 201. Original pattern husky Klein Side Cutting Plier. Square nose. Made in five sizes—5, 6, 7, 8, and 9 inches.

No. 242. Klein Oblique Cutting Plier (heavy-duty pattern). A very useful tool that cuts close. Length, 6 inches.



No. 201 NE. The famous "streamlined" Klein Side Cutting Plier. Made in five sizes —5, 6, 7, 8, and 9 inches.

No. 203. Klein Long Nose Plier. Long reach of jaws permits getting into difficult places. Made in 6 and 7-inch sizes.

The Klein Pocket Tool Guide, showing the Klein line and containing useful tool information, will be mailed on request.

Established 1857

Mathias KLEIN & Sons

Established 1857 Chicago, Ill., U.S.A.

3200 BELMONT AVE. CHICAGO 18, ILL.

Street Light (906)

Line Material's Directolite street lighting luminaire is for smaller communities and areas where highest intensity is not required (will take 7-in. light center lamps) or where economy is a major factor. It is available in one asymmetric and two symmetric styles to produce types 2 and 5 IES light distribution. The reflector is of tough quenched glass which is processed to give resistance to impact and corrosion. The inner surface is said to have a high reflection factor. Reflector has mirrored-glass surface. Nineteen high-voltage and ten low-voltage die-cast aluminum heads are offered in either pendant or side-mounted styles. Four wet and dry process porcelain heads also are available. May be used on either multiple or series systems.

M-V Luminaire (907)

The L-M Controlite Sr. for mercury-vapor lamps is recommended by the manufacturer for busy main street thoroughfares, etc. It is available for pendant or side mounting and produces either type 4 or 5 IES light distribution. A type E-H1, 400-watt, mercury-vapor lamp is said to be best suited to this unit. It has a rated output of 21,000 lumens, producing a net over-all efficiency, lamp and ballast, of approximately 46 lumens per watt. Rated life of the E-H1 is 4,000 hours based on turning off and on once in ten hours. Seventeen inner and outer wired styles of die-cast metal heads are offered for the Controlite Sr.

Soft White F Lamp (908)

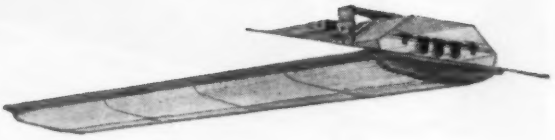
G-E has a new fluorescent lamp with a "soft white" color said to be complimentary to human complexion and to make colored objects look natural. This lamp supplements its other white fluorescent lamps.

F Fixture (909)

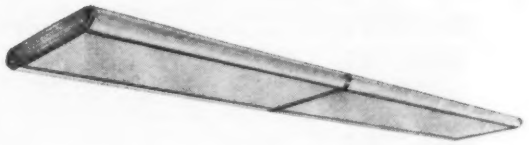
Smithcraft's Eye-Q is a two 40-watt F fixture of all-metal construction. It is said to have an 83% efficiency with down lighting and overhead illumination. Louvers open from either side and may be completely removed without fastening devices.

SUNBEAM *is lighting the West!*

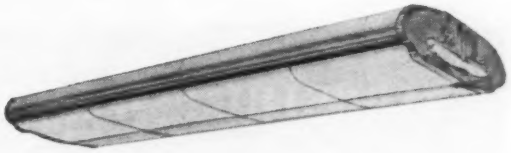
IN LOS ANGELES The General Petroleum Building is illuminated by this Sunbeam fixture.

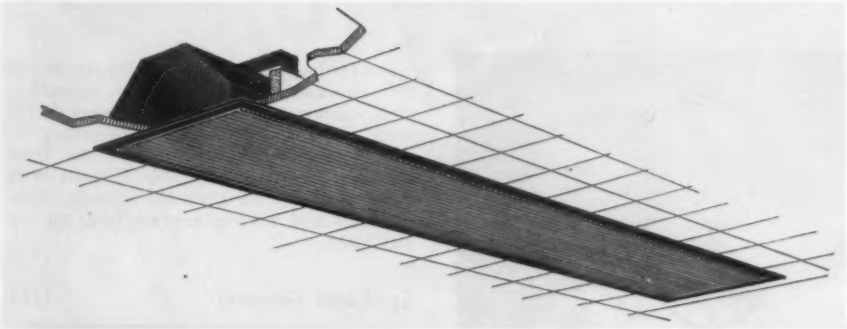


IN SAN FRANCISCO The Schlage Lock Company chose this Sunbeam fixture for their new building.



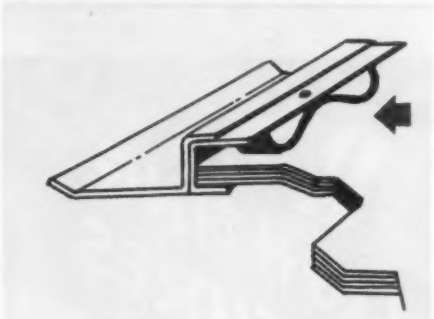
IN WESTWOOD The new U.C.L.A. Library will be scientifically lighted by this Sunbeam fixture.



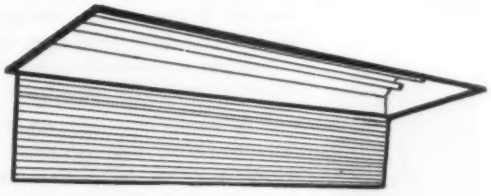


IN PORTLAND The Lincoln Building was comfortably modernized. This Sunbeam fixture No. 903-48, a deep troffer recessed unit, was specified for installation. About 2,000 fixtures; some single units, others in continuous runs, will afford excellent light distribution throughout.

These are only a few of the many recent Sunbeam installations. These are only a few of the many fixtures in the Sunbeam line.



Exclusive Sunbeam "light guard" spring clips which eliminate all light leaks between glass and frame.



Glass support frame swings down on full length piano hinge for easy maintenance.

SUNBEAM

LIGHTING COMPANY

All Sunbeam Fixtures Sold Only Through Leading Electrical Distributors
777 East 14th Place • Los Angeles 21, California

THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS Fully automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE Will operate efficiently over an extended voltage under widely varying temperatures.

GUARANTEED FOR ONE YEAR

The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP-30-40) for use with either 30 or 40 watt lamps
The (SP-100) for use with 100 watt lamps

Ask for descriptive literature

INDUSTRIAL ELECTRONICS CORP.

MAIN PLANT Newark 2, N. J.

R&S LIGHTING FIXTURES

VAPORTIGHT... EXPLOSION-PROOF... DUST-TIGHT...

Write, on letterhead for new catalog H-47.

For safe and correct lighting in hazardous areas, count on R & S Lighting Fixtures to stand up better . . . to deliver long-term, top performance . . . because of illumination engineering ingenuity and over forty years' manufacturing know-how.

Scientific design with high reflection factor provides maximum, safe, controlled lighting . . . maintenance-free. Standardized base common to all sizes. Interchangeable reflector globe assemblies of various capacities. Simplified mounting without disturbing electrical connections; with a variety of conduit arrangements in one standard base. Underwriters' laboratories approved.

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SINCE 1902

RUSSELL & STOLL COMPANY, INC.

Precision-Built Electrical Equipment

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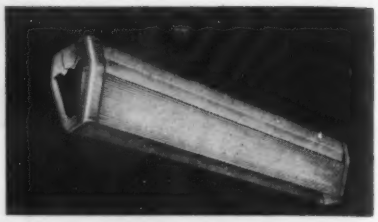
Single-Lamp Fixture (910)

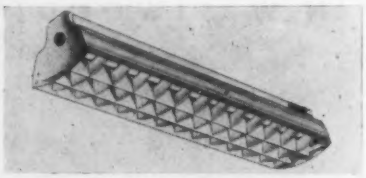


Sylvania has introduced the Peabody CSG-120 and CSG-140, glass- shielded single-lamp fluorescent fixtures. These units are built around the company's basic unshielded 20-watt and 40-watt utility fixtures, with opaque glass diffusing panels and end caps with decorative medallions added. Can be used individually or end-to-end. Right-angle ends are made possible by a curved attachment.

Commercial F Light (911)

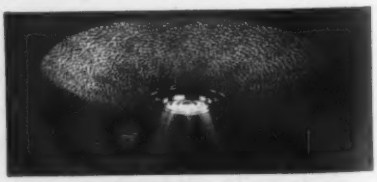
Mitchell Mfg. Co. has a new commercial fluorescent unit in two 40-watt and four 40-watt models. It is an open-type luminaire, with 20-gage steel channel reflector finished in baked white enamel. May be flush or suspension mounted, individually or in continuous rows.

All-Purpose Unit (912)



Leader has announced an all-purpose SM-440 luminaire. Light diffusion upward is 40% (indirect) and 60% downward (direct). It is an all-metal fixture giving 35° and 25° shielding with metal louvers. Other shielding angles are available. Louvers swing down and may be removed entirely. Alzac reflectors and louvers are available on special order.

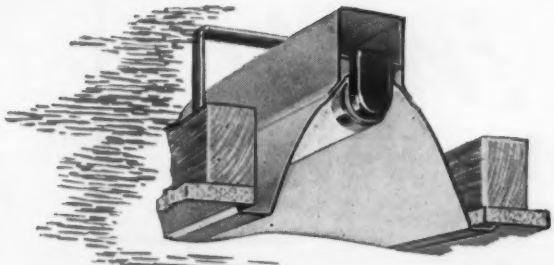
Spot and General (913)



Lightolier's Advance Pacemaker is designed to give pin-point lighting on an interest spot and general over-all illumination. Two-circuit wiring and a central "colouvered" lens of clear glass are features. This fixture is 19½ in. in diameter and 4½ in. deep.

Two-Lamp Fixture (914)

A 2-lamp fluorescent light, CD-80, for school or office use has been announced by Westinghouse. It is available as a direct-indirect type with steel louvered bottom or as a semi-indirect type with a translucent plastic bottom. Luminaire is well shielded and gives maximum diffusion with low brightness. Single- and twin-stem hangers are available for suspension mounting. A 4-lamp CD-160 also is available.



WHEN YOU TALK ABOUT
PLANNED LIGHTING . . .
TALK ABOUT . . .

Curtis EYE-COMFORT TROFFERS

Illustrated above is a partial view of one of the many departments in the First National Bank of Chicago, showing its installation of A B C Lighting. Approximately five miles of Curtis "Eye-Comfort" Troffers have been installed, providing over 50 footcandles of glareless illumination on the working plane.

Curtis "Eye-Comfort" Alazak Aluminum Troffers . . . easily installed and maintained . . . utilize the new 40 watt, T-17, 60-inch low-brightness lamp. The reflector contour approximates a parabola and is designed to direct a maximum amount of light to the working plane but limits the amount delivered to the eye . . . true A B C Lighting.

Appropriate Brightness Control, the big feature in modern lighting. The Key? . . . the luminaire . . . the CHARACTERISTICS? . . . high light utilization with low unit brightness. PLUS the relationship of the chromatic values of room contents. Write Curtis for further details . . . for easier sales.

Certified FLEUR O'LIER CERTIFIED

NEMA

CURTIS LIGHTING, INC.
6135 WEST 65th STREET, CHICAGO 38, ILLINOIS
CHICAGO . . TORONTO . . NEW YORK

Turn freely in this belt...

BUCKINGHAM *Glider* TOOL BELT

Yes, with this tool belt, you can turn up to 4½" right or left without binding your clothes or cramping your tools. That's because the Glider Tool Belt has a "floating" feature that allows fuller, freer body movement. Here's how: The middle belt, attached to the safety strap, does not move when you turn. The safety strap does not shift on the pole. The outer strap and inner liner slide easily without pulling or binding . . . without costly wear and tear on your clothing. Tool loops remain full and open. You can turn without tiresome, time-consuming shifting of your feet. You can change your position quickly, easily and safely.

And you can depend on the Glider Tool Belt for that all-important safety too. It's made of stout, tan-colored harness leather and stitched with tough nylon thread. It's built to the highest standards of quality to give you a good, dependable belt.

A BUCKINGHAM BELT is a good belt.

A BUCKINGHAM BELT is designed for comfort and ease of movement.

A BUCKINGHAM BELT is built to make safety a certainty.

BUCKINGHAM TOOL BELT NO. 1201

BUCKINGHAM TOOL BELT NO. 1201

A sturdy, practical tool belt built to give you years of comfortable, trouble-free service. Rolled edge leather lining. Inner belt is 4½" at back, tapering to 2½" at heel of dee ring. 2" belt strap has five tool loops and is fitted with harness ring, snap hook and tape thong. Inner belt has tab extended on each side. To these you can rivet any standard or special tool holsters or pouches.

See these tool belts at your regular supply house, or—write directly to us for Catalog 548 describing the full Buckingham line of equipment.

BUCKINGHAM MANUFACTURING CO., INC.
5-7 Travis Street Binghamton, N. Y.

Street Light Control (915)

Fisher-Pierce Co. has a new Series, 63300 photoelectric street lighting control with a capacity of 3,000 watts of incandescent lamp load. Models are available for 120 and 230 volts, 50-60 cycles. The unit is designed to control all types of outdoor lighting. Lights are controlled according to preset values of daylight intensity. Standard turn-on adjustment is 0.5 f-c with turn-off at 1.25 f-c. Turn-on can be adjusted from 0.5 to 4 f-c. Turn-off will remain approximately 0.75 f-c higher than turn-on.

Airport Line (916)

Line Material has announced new items in its airport lighting line. A rotating beacon for Class 1 and 2 airports (illustrated) is for pole or roof-top mounting and is designed to meet CAA specification L-801. It has two standard 100-watt sealed-beam lamps giving 200,000-beam candlepower on normal rated voltage, with 500-hour life; a

20% over-voltage operation will give more than 400,000-beam candlepower.

The L-M Bartow 36-in. rotating beacon for Class 4, 5, 6 and 7 airports consists of a single-lamp rotating mechanism with five powerful beams—two main beams, white and colored spaced 180° apart and normally set 1.25° above horizontal, and two sweep beams emitted at right angles to the main beams, 5° and 16° above horizontal.

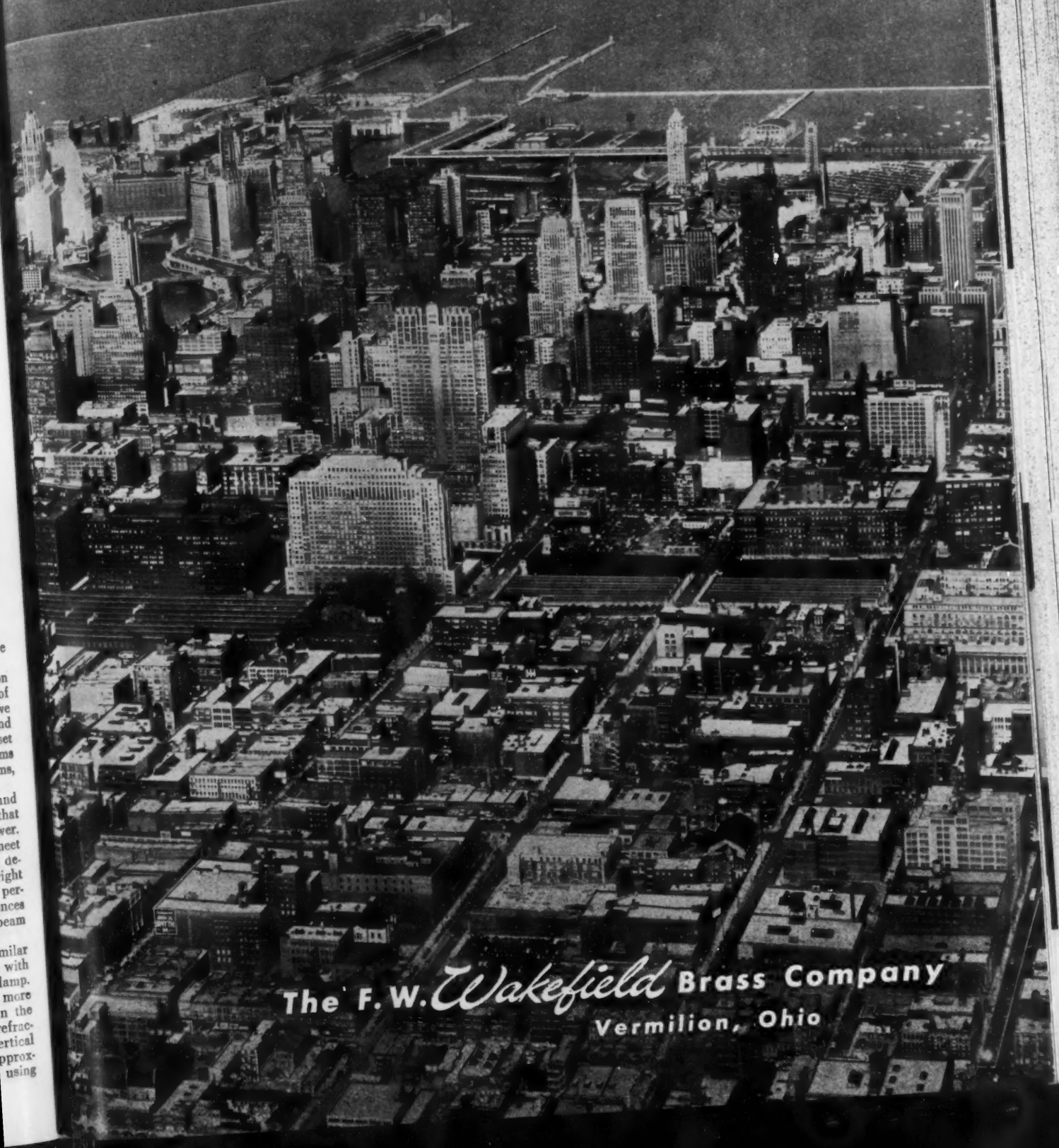
The Bartow high-intensity approach and runway light is a beam-controlled unit that provides up to 180,000-beam candlepower. Beam intensity may be modified to meet specific visibility requirements; specially designed optical system directs light to right place at right intensity; color screens permit quick change-over if new color sequences are adopted. Is available with fixed-beam construction if desired.

The L-M elevated runway light is similar to the above except that it is designed with a fixed beam and uses a lower-wattage lamp. It is said to furnish about three times more candlepower for the pilot at night than the old-style flush contact unit. A 2-piece refractor gives 360° horizontal and 180° vertical distribution. A maximum beam of approximately 2,000 candlepower is provided using a 45-watt lamp.

Wakefield ADVERTISING COVERS:

School · Office · Store Markets — With

4,600,000 Impressions a Year . . .



The F. W. Wakefield Brass Company

Vermilion, Ohio

for Eleven Types of Industrial Lighting Units...

THIS LABEL WARRANTEES CONFORMANCE TO IMPORTANT STANDARDS

Whenever your LIGHTING PLAN calls for one or more of these eleven popularly employed lighting units, RLM labeled equipment insures you of units made to conform to important standards relating to lighting equipment efficiency, ease of maintenance and long life. They cover . . . (1) Materials (2) Reflection Factor (3) Construction (4) Photometric Performance (5) Accepted Criteria (6) Auxiliary Control Equipment Standards (7) Conformance to National Electrical Code.

No lighting unit can bear this RLM LABEL unless continuous compliance to RLM specifications has been determined by the Electrical Testing Laboratories. For a COMPLIMENTARY COPY of COMPLETE RLM SPECIFICATIONS for ELEVEN INDUSTRIAL LIGHTING UNITS, write any of the manufacturers listed below or address your request to RLM STANDARDS INSTITUTE, Suite 815 326 W. Madison Street, Chicago 6, Ill.

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Spec. No. 1 Dome	Spec. No. 2 Deep Bowl	Spec. No. 3 Symmetrical Angle	Spec. No. 18 Glassteel Diffuser	MANUFACTURER	Spec. No. 5 2-40 W Lamps	Spec. No. 6 3-40 W Lamps	Spec. No. 7 2-100 W Lamps	Spec. No. 9 2-40 W Lamps	Spec. No. 10 3-40 W Lamps	Spec. No. 11 2-100 W Lamps
X				Appleton Electric Company						
X	X	X	X	Benjamin Electric Mfg. Co.	X	X	X	X	X	X
X				Bright Light Reflector Co.				X	X	X
				Day Brite Lighting, Inc.				X	X	X
X				Jones Metal Products Co. (Abolite)						
X				The Miller Company	X	X	X	X	X	X
				Mitchell Manufacturing Co.	X	X		X	X	
X				Overbagh & Ayres Mfg. Co.						
X	X	X	X	Quadrangle Mfg. Company						
X	X	X	X	Smoot-Holman Company	X	X		X	X	X
				Sylvania Elec. Products, Inc.				X		X
X	X	X	X	Westinghouse Electric Corp.	X	X	X	X	X	X
X	X	X	X	Wheeler Reflector Company	X	X	X		X	X

*Based upon Report for the Fourth Quarter of 1947 and supplementary reports by Electrical Testing Laboratories, Inc., the independent testing agency of the Institute.

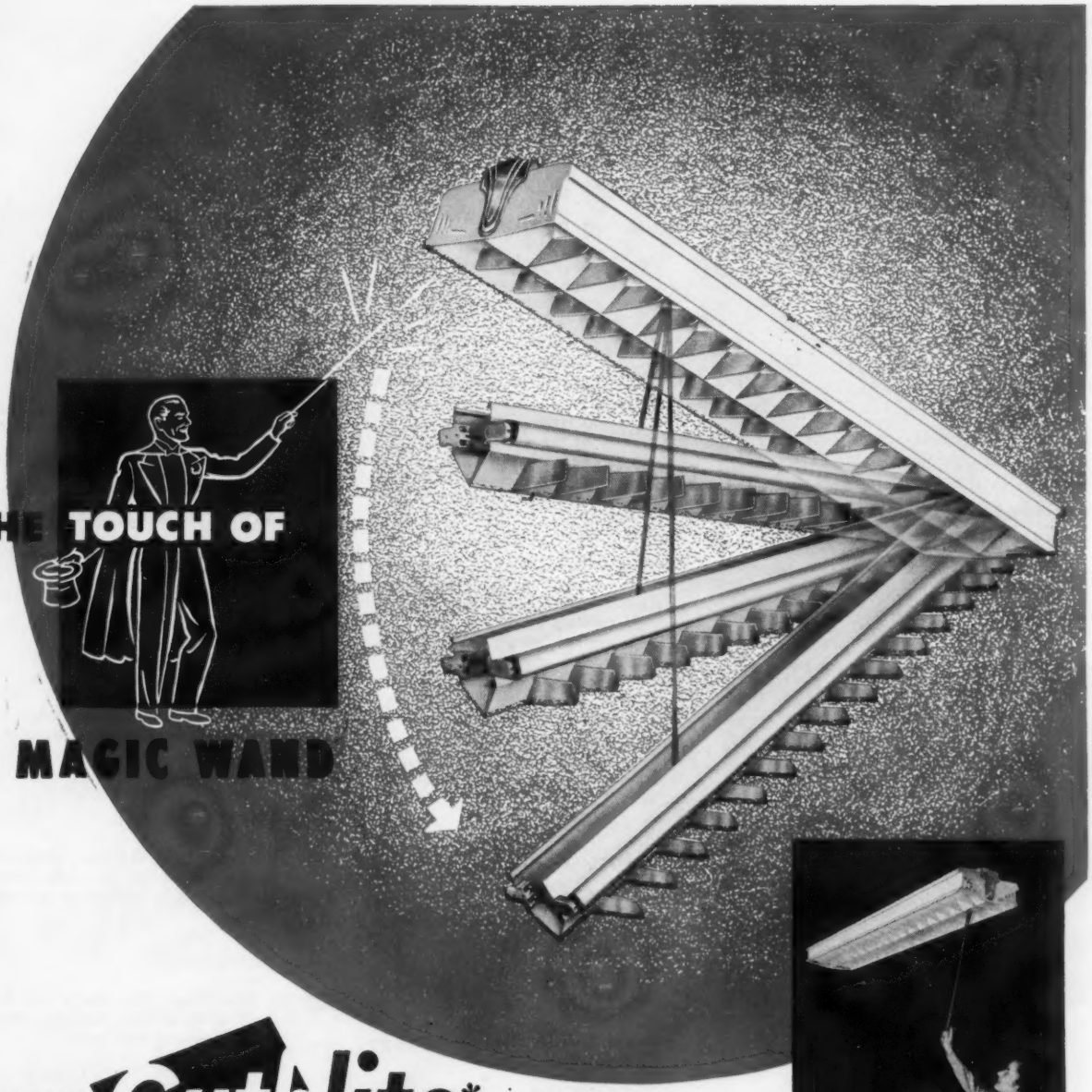
** *Spec. #22 covers a new 2-40 W fluorescent longitudinal shield unit.*

R-2932-S

* *Electrical Testing Laboratories, Inc., 2 East End Ave., New York 21, N. Y.—an independent testing organization, serving American industry for 50 years and responsible for the inspection and certification of lighting units to* RLM *Specifications. Fourth Quarter Report above shows manufacturers who can supply lighting units made in accordance with* RLM *Specifications as indicated by (X).*

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers



The NEW Guthlite* SWINGS DOWN on the MARVELOUS JACKNIFE HINGE!

This Magic Wand Does The Trick!

No wonder maintenance costs take a nose dive, when maintenance time is cut as much as 80% with GUTHLITE!

No more maintenance ladders! No more acrobatic porters! No more fuss, muss, bustle, or bother! Now, with the amazing new GUTHLITE, fluorescent maintenance is a fast, simple, floor-level job!

Just a twist of the wrist with the maintenance rod, truly a magic wand, and down swings the reflector on the patented Jacknife Hinge. Then speedily, safely, efficiently—lamps are replaced, starters changed, reflectors cleaned—then up swings the reflector to go on with its efficient lighting job!

There are dozens of facts you should know about the revolutionary new GUTHLITE. Get them all. Write today for Bulletin 3845-F

*Trade Mark.
U. S. & Canadian
Patents Applied for

THE EDWIN F. GUTH CO. • St. Louis 3

Leaders in Lighting Since 1902

Guth

WHAT'S *Your* ANSWER, MR. CONTRACTOR?

A man who read one of our recent ads in SUNSET told us: "I am sorry I didn't know about your *Westlite* pin-hole spot a little sooner. I wanted something like that for the dining-room of my new house, but the electrical contractor discouraged me, because he apparently didn't realize such fixtures were available."

Are *you* losing profitable plus business on your domestic and commercial lighting installations?

We have a complete line of high grade lighting fixtures, designed and manufactured in San Francisco to anticipate the trend toward controlled illumination from recessed sources. Engineered for easy maintenance-free installation.

Illustrated is our *Westlite* No. 0760, a "pin-hole" fixture for focussed pattern beam.

Write for catalog describing this and many other *Westlite* fixtures available.

ASSOCIATED LIGHTING SERVICE

WESTLITE

Engineered Lighting

488 Bryant St. San Francisco, 7

BULLETINS ETC.

Induction Motors (917)

In a 24-page bulletin, Allis-Chalmers describes its large induction motors of the squirrel-cage wound-rotor, bracket bearing and pedestal bearing types. This bulletin charts electrical characteristics, representative full-load power factors, and approximate range of standard open, 40° C. rise, continuous rated motors with ranges for both bracket and pedestal bearing types. Stator, rotor and bearing constrution of the motors is described, along with some common special features which can be provided with mechanical modifications to suit particular applications.

Fluorescent Line (918)

Pittsburgh Reflector Co. has published a 52-page catalog of its line of fluorescent luminaires, troffers, strips, accessories, etc., with companion incandescent equipment. A section is devoted to planned lighting. Installation details, suggested applications and coefficient of utilization tables are given for every unit. Recommended levels of illumination for various types of installation are included. Cross indexing simplifies selection of equipment.

Resistors, Rheostats (919)

Ward Leonard Catalog D-130 covers that company's line of resistors, rheostats and radio armature relays.

Connectors (920)

Howard B. Jones Catalog 16 lists that company's connecting devices.

Pumps for Maintenance (921)

Four new self-priming portable pumps designed for utility company maintenance work are described in a bulletin released by Marlow Pumps. Lightweight aluminum construction, minimum floorspace requirements, and governor-controlled 4-cycle engines are among the features of the line, the company states.

Sign Transformer (922)

A midget, hanger-type transformer for signs is described in an 8-page bulletin released by General Electric Co.

Voltage Regulator (923)

Bulletin SF-100 from Burlington Instrument Co. gives data on the company's Synchrostat generator voltage regulator, Type SR, Model SF.

Sub-Assemblies (924)

G-E permanent magnet sub-assemblies are described in a 4-page booklet recently released.

Lamp Guards (925)

Ericson Mfg. Co. has published Catalog 48, listing its rubber portable lamp guards, inspection lights, rubber wiring devices.

Templates (926)

Rapidesign, Inc., has a new bulletin covering its templates for engineers, designers, draftsmen and architects.

Switches (927)

The Arco line of bakelite-enclosed and open-blade switches is described in a 24-page bulletin released by that company.

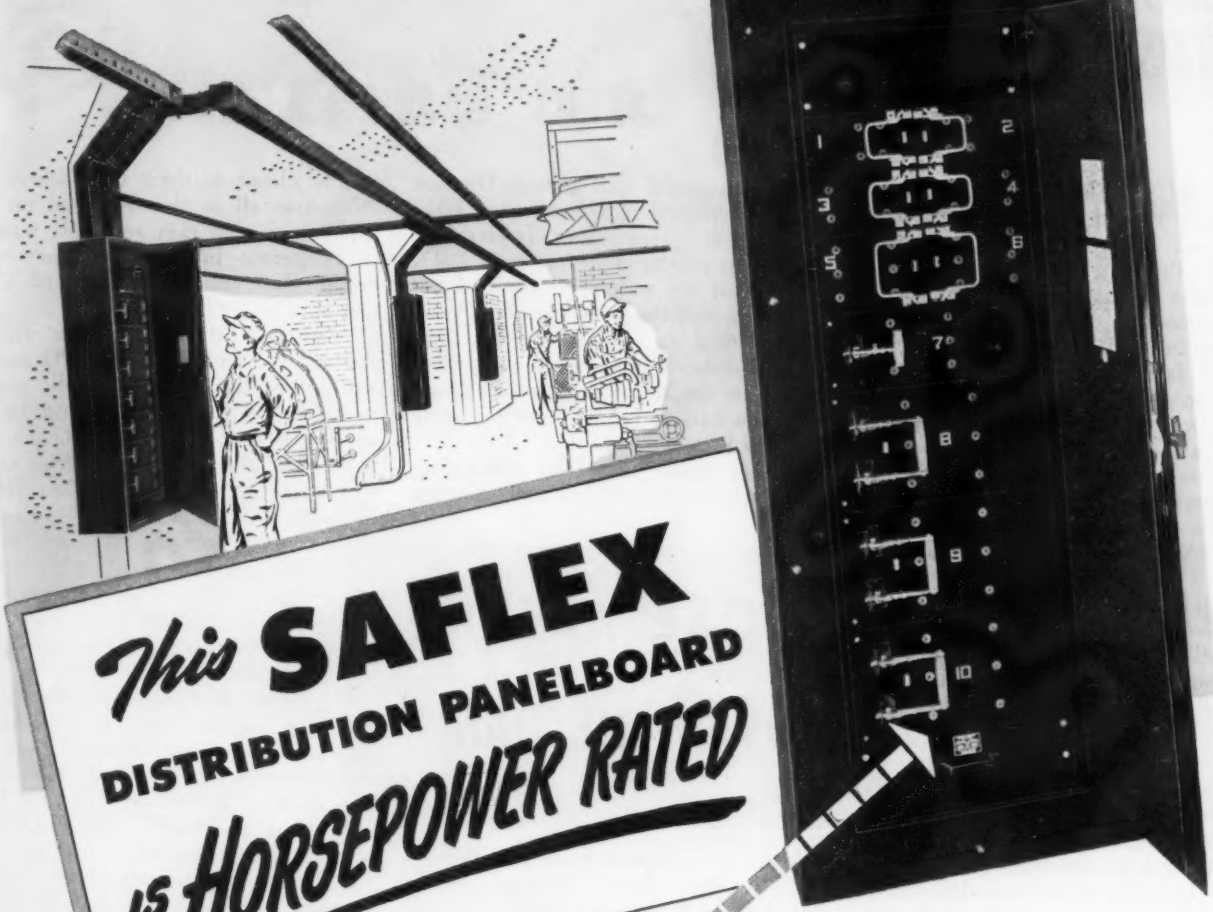
ELECTRICAL WEST, 68 Post St., San Francisco 4, California
Please send me information about following CIRCLED items:

900	901	902	903	904	905	906
907	908	909	910	911	912	913
914	915	916	917	918	919	920
921	922	923	924	925	926	927

Name..... Company*..... Title*....

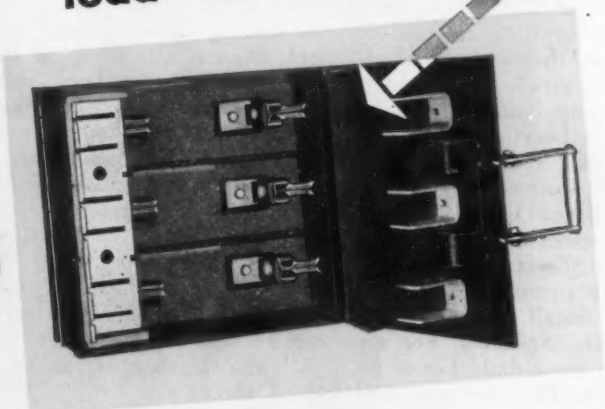
Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



This SAFLEX DISTRIBUTION PANELBOARD IS HORSEPOWER RATED

All circuits may be opened safely under maximum load—but other features are important too...



✓ Each circuit is in individual steel box readily removable and interchangeable with circuits of other ratings.

✓ Double break switch jaws on rotary blade holder can be turned to "OFF" and cover locked. Cam action handle supplies operating force necessary to high contact pressure. Positive pressure fuse clips minimize heating.

✓ Easy to install. Wiring gutters are oversize. Interior and trim are separate from box.

✓ Shock-proof insulating base is typical of sound design and careful construction throughout.

ASK YOUR ELECTRICAL WHOLESALER

SQUARE D COMPANY

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ELECTRA'S HUSBAND

BECAUSE Electra comes from a long line of valley ranchers, I let her read the letter from the Central Valley Project Watermaster that is published on page 56 of this issue. She had something more than a passing interest in the 1948 spring drouth. Her family farms a couple of thousand acres in the Sacramento Valley.

"So you are presumptuous and you show a simple-minded grasp of the purposes of Shasta Reservoir," Electra commented when she finished her reading. "Mr. Blote rates you lower than I do when I'm mad at you. Why don't you let me tell him off? I'd like to ask him a few questions about the 160-acre limitation deal. But there's one thing about this letter I can't understand. Why a personal epistle? Can't he speak officially?"

"Not and say the things that he does," I answered. "It would be most impolitic and inappropriate for a government official to indulge in vilification and derogation. And as for presumptuousness in criticizing Shasta Dam operations, I'll exercise my inalienable right of free speech until the Kremlin boys liquidate me. Finally, when it comes to a simple-minded grasp of realities, Mr. Blote should watch his own arguments. There are certain simple aspects of multi-purpose projects that he ignores and one of them is flood control. However, in the light of what happened at Shasta Dam this spring maybe he'd like to skip it."

"What do you mean?" Electra interrupted.

"Well some of the folks with the Army Engineers became quite concerned when Mr. Blote let Shasta Dam begin to fill up," I explained. "You see, generally speaking the top 500,000 acre-ft. of capacity in the reservoir is reserved for flood control until after May 15. When this safety margin was exceeded, the Army Engineers expected the outlet valves to be opened. This wasn't done. Finally the dam spilled. Although there was no flood, some farmers did suffer damage. And incidentally the Reclamation Bureau had to suspend work on Keswick Dam because of the high water.

"Fact of the matter is that Mr. Blote probably knew on March 4 when the meeting he described took place, that Shasta Reservoir would not only fill, but that it would spill as well. On that date he reported that there were 400,000 acre-ft. more water behind the dam than at the same time in 1947. Surveys of the watershed back of the dam indicated then that the water crop would equal or exceed that for 1947 even if didn't rain another drop. But when you are following a propaganda line, you have to ignore some perfectly obvious facts such as that."

"What about the third generating unit in the power house?" Electra asked. "He seems to have you there."

"The Reclamation Bureau people say that the generator wasn't ready until April 13," I answered. "However, strangely enough Mr. Creim testified as far back as 1946 before a Congressional committee that it and a companion unit would be ready within 12 months. This would have had the machines in service in May 1947. Even as late as September 1947, in some of the USBR reports there was a schedule on the Shasta power house which set the date for unit No. 3 as November 1947, No. 4 as December 1947 and No. 5 as May 1948. The three generators at Keswick also were scheduled for March, April and June 1948.

"Up to the present only two of the three additional Shasta machines are in service. Why so much extra time was required to install them has never been satisfactorily explained. For my part, I'd like to see a daily log of installation progress. There are ways and ways of figuratively dragging the feet when by so doing you can embarrass somebody."

"You don't mean to infer that they would use the slow down like the unions do on the waterfront," Electra interrupted again.

"I didn't infer anything," I continued. "The potential emergency was apparent in January. It would just seem natural that a little extra effort might have enabled the USBR to come a mite closer to their own schedules. Of course all of this is based on the supposition that they seriously wanted to cooperate in the emergency that might confront the people of California.

"Naturally if the program was to continue to embarrass the PG and E and follow the bureau's public power propaganda line, then stalling tactics were in order. It is one of those cases in which the facts probably never will be brought to light. The fact of the matter is that by failing to have generating capacity available and by operating the reservoir in the manner dictated by the progaganda line, they not only embarrassed PG and E but the people of California as well.

"Mr. Blote says that the aim in the management of Shasta to achieve a full reservoir was endorsed by PG and E among others. If anybody in that company endorsed a deal like that, he should have his head examined."

"What was that crack about 50-cent-an-acre land?" Electra queried.

"A mistake for certain," I said. "He meant grazing rights at 50 cents. Your forebears didn't get land in the valley for that cheap a price.

"There is another angle to this whole thing that bears some explanation. Somebody might tell just where the drum gates were stored for months and months. At any rate they were missing. Had they been installed before the late spring rains, Shasta Dam would have stored another million and a quarter acre-feet of water. Like the generating units though, they were 'behind schedule.' There might not have been any need to spill water had the gates been installed. And the carry-over conceivably could have been more than the 1,600,000 acre-ft. that will be back of the dam in September.

"There is only one certain fact in this whole argument. Water went over the dam that might have been put through turbines at a very critical period. Also when storms did come and there was a heavy runoff there was no capacity back of the dam to hold back the flood waters. In the operation of any multi-purpose project both of those constitute black marks in my book."

"Let's break up this argument," Electra cut in. "It's all just so much more water over the dam."

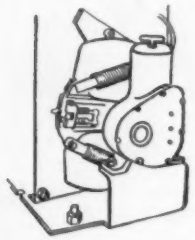
*DFR Regulator Control Holds ±1 Volt Band and is the SIMPLEST!

*DFR CONTROLS ARE EASY-TO-SET, ACCESSIBLE DUE TO UNIQUE UNIT CONSTRUCTION!

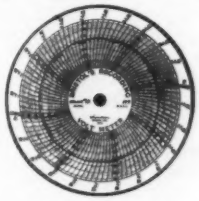
IN ADDITION TO maintaining a narrow ± 1 volt band width, the automatic control of the DFR regulator is the simplest of any regulator. With Allis-Chalmers unique unit control construction, the entire control is mounted on a single hinged chassis with a "dead front" panel. Controls are accessible . . . understandable. Relay setting is simplified because troublesome compounding or holding coils are eliminated. Elimination of these parts is possible because only micro energy is handled by relay contacts. And that's not all!

The DFR regulator requires only 8% excitation compared with the 25% excitation required by conventional regulators. High exciting current is important to you in terms of cost of equipment used for unnecessary excitation of regulators . . . in terms of installed capacitors . . . at $10 per kva . . . needed to balance high exciting current.

For further details on how you can get this simple, close voltage control, call your nearby A-C office, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2338



An oil-immersed, rugged, self centering, shock absorbing, quick-break mechanism is used.



Narrow band widths due to automatic "Feather Touch" control and full voltage integration.

*DFR — the only station type step regulator you can buy for single phase duty. Sizes up to 6900 v, 250 kva. AFR — for 3 phase regulation.

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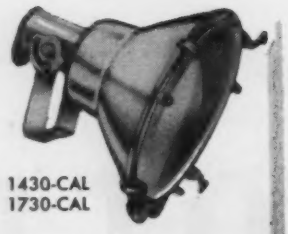
"Originators of the 5/8% Step Regulator!"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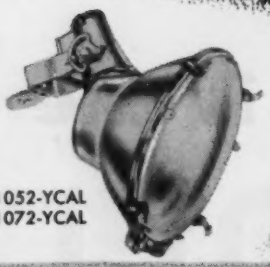
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"RED CAP"
FLOOD-LITEING

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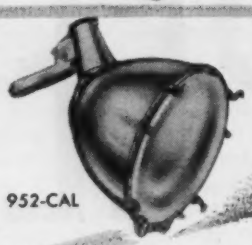
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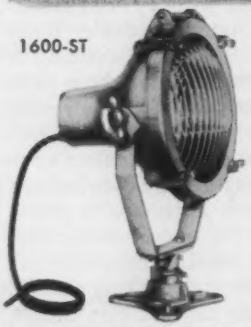
GIVES YOU
Modern, Efficient, and Dependable Lighting at LOW COST!

1801-ST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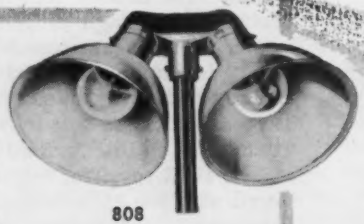
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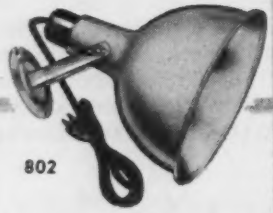
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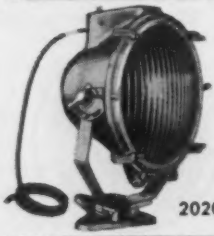
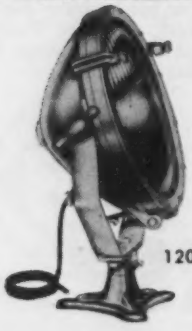

2020-ST

800-SC


1200-ST

834-PS

Industries, recreation centers, and sports promoters have much in common when it comes to lighting. In factories, where safety and efficiency are important, illumination must be adequate and dependable. Sporting events staged after sun-down—as well as friendly back-yard games—also depend on shadow-free lighting. Wherever there is a need for better visibility, *good lighting* pays *good dividends!*

"Since 1909" S & M has pioneered the development of lighting equipment for every type of installation . . . industrial, domestic, automotive, outdoor . . . keeping abreast of modern design, and the need for trouble-free lighting at low cost. Order direct from your dealer or distributor—or write us for free planning service on lighting installation to fit your particular requirements.

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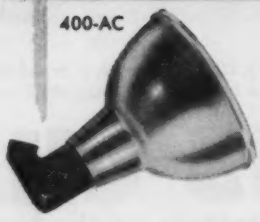
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ANGLE CAPS

"SINCE 1909"

Now! STANDARD EQUIPMENT WHICH GIVES Custom Designed LIGHTING

"Pittsburgh" Permaflector

PITTSBURGH REFLECTOR COMPANY PRESENTS FOR THE FIRST TIME a line of recessed units in architectural modules—whose application is limited only by the requirements of the designer. These units may be mounted individually, in continuous rows, patterns and squares.

FOUR INTERCHANGEABLE SHIELDING ASSEMBLIES provide every type of shielding. Each Assembly is self-contained within a metal frame and quickly attaches to the Troffer. Frames are piano hinged and latched to simplify maintenance.

COMPANION INCANDESCENT EQUIPMENT, designed especially for use with Universal Troffers, complements the line and gives the "accent" lighting needed for planned lighting installations.

For details on the Universal Troffer and companion equipment, send for Advance Notice Sheet 40.

PITTSBURGH REFLECTOR COMPANY

OLIVER BUILDING · PITTSBURGH 22, PENNSYLVANIA

MANUFACTURERS OF FLUORESCENT AND INCANDESCENT LIGHTING EQUIPMENT

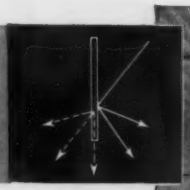
DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

Permaflector Lighting Engineers in All Principal Cities

as announced in TIME.

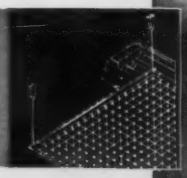
"SKY-GLO" CONVERTS OLD CEILINGS INTO GLOWING NEW ONES!

luminous



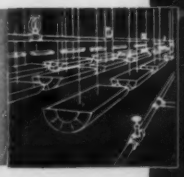
Unlike wood or metal "egg-crate" louvers, "Sky-Glo" not only reflects light but is translucent, having a light transmission factor of 71%. It is made of non-flammable Vinylite, product of the Bakelite Corporation.

costs less



"Sky-Glo" is a system of channels, fittings and louvers of standardized sizes which makes it easy to fit a "Sky-Glo" ceiling to any size room. The simple, quickly assembled units reduce cost; actually "Sky-Glo" costs less than the usual conventional false ceiling.

hides ugliness



With "Sky-Glo" the usual overhead unsightliness, sprinkler heads, pipes, obsolete ceiling decorations and "forest" of conventional lighting units required to provide comparable levels of illumination are replaced by an ultra-modern, continuous sky of unobtrusive light.

know "Sky-Glo"

"Sky-Glo" heads a trend. Whether you use, specify or install lighting equipment you MUST know all about "Sky-Glo". For comprehensive "Sky-Glo" Data Manual write: Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Illinois.

BENJAMIN
"Sky-Glo"
LUMINOUS LOUVERED LIGHTING SYSTEM

R-2901-S

Product of Benjamin Electric Mfg. Co., Des Plaines, Ill., The Nation's Largest Manufacturer of Lighting Equipment—Established 1901—Makers of a complete line of lighting equipment for Industrial, Commercial, Play Area and Utilitarian Requirements. Distributed Exclusively Through Electrical Wholesalers.

"Sky-Glo" creates a new epoch in lighting application! The most important development since the advent of fluorescent lighting...

"Sky-Glo" is not just another improvement in lighting equipment! *It is a wholly new way to use light!* No other single improvement can do as much to modernize an interior as "Sky-Glo". It replaces overhead unsightliness with a continuous sky of glareless, shadowless, pleasant and stimulating light. Its unique lighting advantages stem directly from the development and adaptation of Vinyl Chloride Acetate (a Bakelite Plastic) to the "Sky-Glo" Louver System. The use of these translucent louvers makes possible *"A New Experience in Seeing."*

SEPTEMBER 1948 Vol. 101, No. 3

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

LIGHT IN ACTION

How are things in Europe's Lighting?

Beth McCrone

WHAT is lighting progress in Europe since the war, and what can we learn from it?

For three months last year I toured many of the European countries, more or less as any casual observer, desirous of finding new approaches to problems we have here at home. The study was not of a technical nature, but rather a wish to understand the general situation of lighting at the moment, to learn how they are approaching the lighting for the future, and to find inspiration for use in my own work in this field.

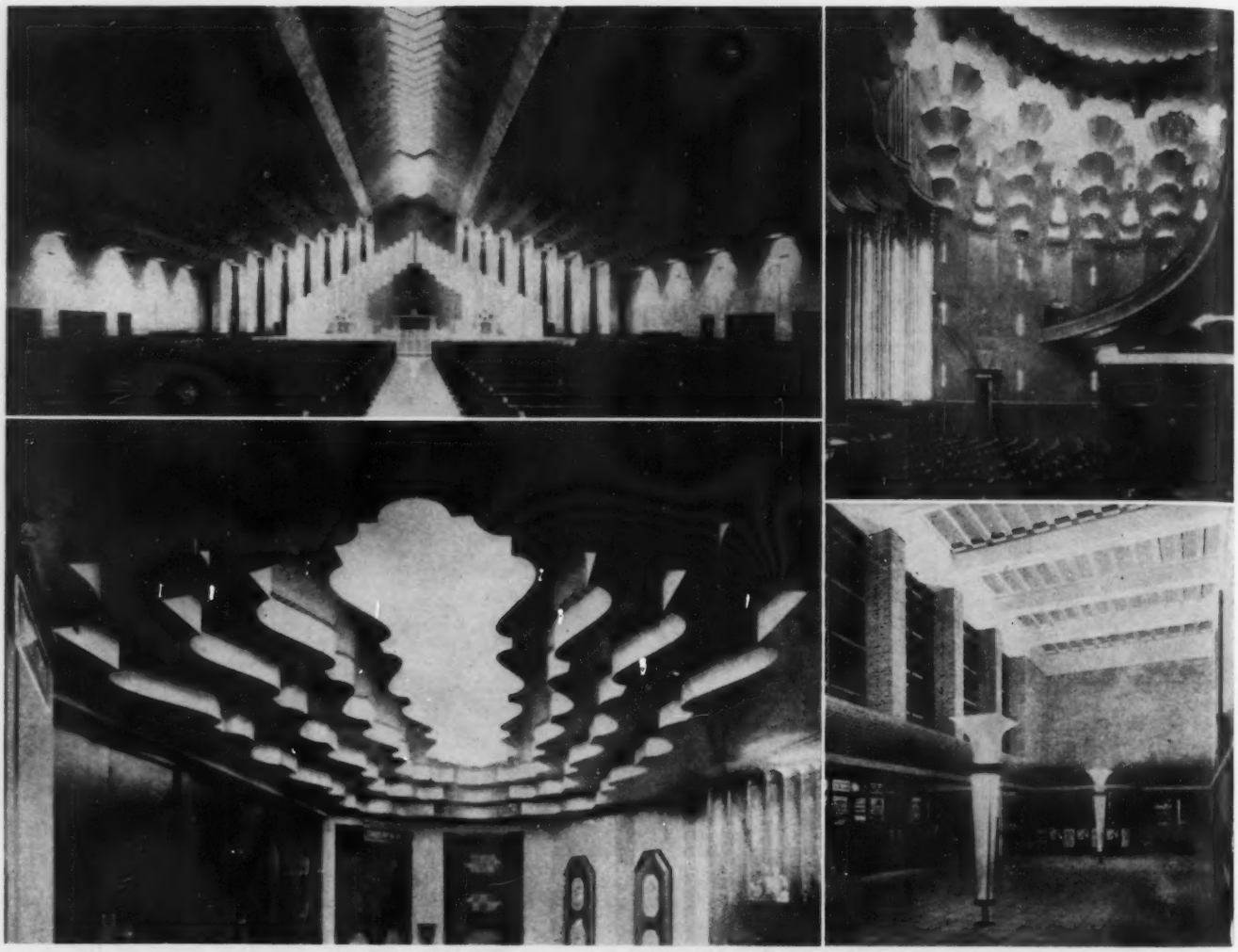
Lighting in England, France and Holland falls into three major catagories: England seems to be most reserved in its lighting applications, approaching each problem from a completely functional viewpoint; in France design and emotional approach take the lead; and in Holland the lighting engineers follow a course in between these two, designing their installations on a brightness engineering basis, with values more in line with ours than perhaps any of the other countries. The middle road generally gives the best over-all results, but certainly much can be learned from a study of the two extremes.

As to understanding the general situation, it must be remembered that every European country has a power shortage far worse than any we have known in this country, and that there are many other shortages. In relation to the lighting field, not only are lamps and fixtures scarce, but also the materials we normally think of for producing light control equipment, such as glass, plastics, metals, and even wood.

It is true that none of the countries have become as "light conscious" as we are, and that many of the lamps and lighting fixtures are of types we knew several decades ago. However, they are endeavoring to approach the various needs in homes, offices and factories with the same concern for brightness ratios and contrasts as we have. And the levels of illumination they are striving for almost come up to the standards we consider necessary for good seeing and for good selling.

In looking back certain things seem rather typical of the various countries, and while these are the personal feel-

Graduate of Stanford in architecture, and illuminating engineering under Dr. Leland Brown, Miss Beth McCrone, San Francisco girl, worked first with Incandescent Supply Co., then during the war for Western Pipe & Steel Co. on lighting design for ships and as inspector checking performance on test runs. She joined Pacific Gas and Electric Co. as residential lighting counsellor and worked in the San Francisco division. Accompanying her mother on a trip to Europe immediately after the war she promised ELECTRICAL WEST her impressions and observations on lighting trends there. On her return she spent a year at Nela Park, with General Electric Co. Lamp Department and has now returned to the West Coast. Material in this article was presented by her to the Northern California Section, Illuminating Engineering Society, of which she is a full member. These views on European lighting progress are stimulating to the lighting profession in the West where much creative work is done and are highly appropriate to this theme issue.



BRITAIN—Church of Christ the King, Cork (upper left), concrete structure with skylight for daylight and artificial illumination. In center are vertical louvers, 2¼ ft. apart in which 50 300-watt units are staggered each side of steel joists. Stations of the cross are lighted from reflectors close to the wall, producing a shadow pattern. Altar is accentuated by 500-watt lamps. Left, lower picture: Foyer of Savoy Theater. Light in center is reflected to a flat pink ceiling. Vertical surfaces catch light, giving illusion of height to the foyer which is only 14 ft. high. Upper right: New Victoria Theater auditorium, where lighting forms most important element in the interior. A "Fantasy of Light"' was designer's object. Arrangement of lighting units and maintenance were important. Lower right: Sudbury Town underground station booking hall. Luminous pylons designed to give indirect lighting. Designed to give 5 f-c with white ceiling, when grey-blue was used, wattage had to be doubled. Treatment differs from usual use of floodlights from top of booking booths directed above and was planned to give accent of light to dispel gloom

ings and observations of one person, they may serve to give you some sort of a picture of conditions as they existed a short time ago in these European countries.

England

In England, the normal everyday lighting seen in most modest homes consists of clear lamps in sockets on walls or dangling from a cord in the center of a room. These often have open shades of glass from the late '20s era, or in many instances are left unshielded. Table and floor lamps on display in many stores have shades large in size with a narrow opening at the top and several inches of fringe around the bottom. Undecorated floor lamps, having a harp and single 60-watt lamp, sell for as much as $60. In a few instances fluorescent lamps were seen in homes. These were used in living rooms in industrial-type reflectors and the unshielded lamps were in full view. As one goes up the financial scale, the lamps are sometimes covered with diffusing glass enclosing globes. More decoration and more expensive materials are used in the portable lamps and fixtures. At the British Industries Fair, the British Thomson-Houston Co. displayed an excellently designed room with the most elaborate built-in lighting that I saw on the entire trip. However, the Englishmen dubbed the Fair "Britain Can't Have It."

In general it is correct to say that the lighting in use throughout the country is far below their recommended standards, and much work is needed before adequate lighting will be the general practice.

Work is being done along this line, but as in all countries, it is a slow process before results can be noted in any great quantity. The British Illuminating Engineering Society is actively concerned with the various lighting problems, and publishes a magazine such as our own *Illuminating Engineering*, to keep its members up-to-date in the lighting field.

The Lighting Service Bureau at No. 2 Savoy Hill in London is an organization which was set up in 1924 by the Electric Lamp Manufacturers Association of Great Britain. Its aim is "to promote the full and proper use

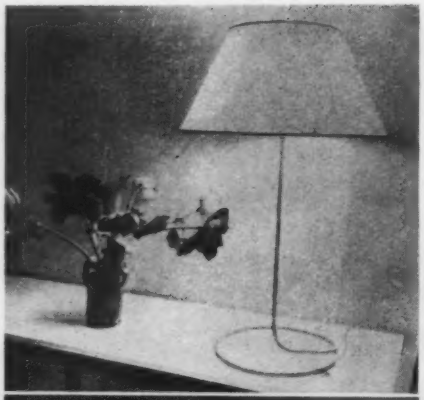
FRANCE—Upper right: Dining room with an incandescent fixture frankly designed and used as part of the decorative feeling in the room. Center: Living room. There is much use of pure white plaster of Paris in lighting equipment, such as in the star-shaped ceiling fixture, the lamp base and in wall brackets. Bottom: Futuristic interior in which designer finds delight in using multi-armed wall brackets at left, and group of floor lamps at rear. Unusual use of perforated metal shades is noteworthy. These same fixtures and shades are also often used in Sweden

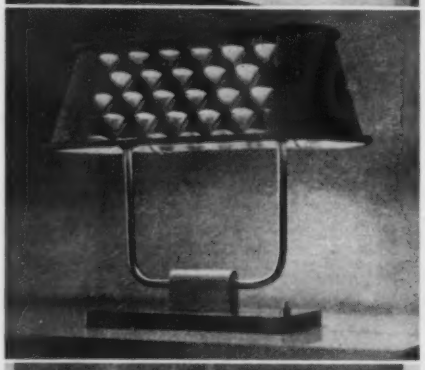
Incandescent fixtures in dining room on a movable arm, puring light over a specific area. (Picture upper left.) The same idea was also utilized in a large floor lamp observed in Italy later

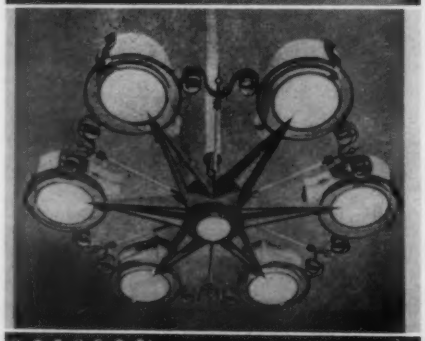
of electric light in the service of the community." The bureau has a staff of trained lighting people. These men and women give demonstrations of lighting principles and advances in lighting techniques in the various rooms which the bureau occupies. These rooms are not elaborately decorated, but they furnish a place where people may go and see the types of lighting recommended as best for their own problems, be it in the commercial, residential or industrial field. The bureau holds regular schools and conferences in its headquarters, as well as going out on tours to deliver lectures on lighting to all parts of the British Isles.

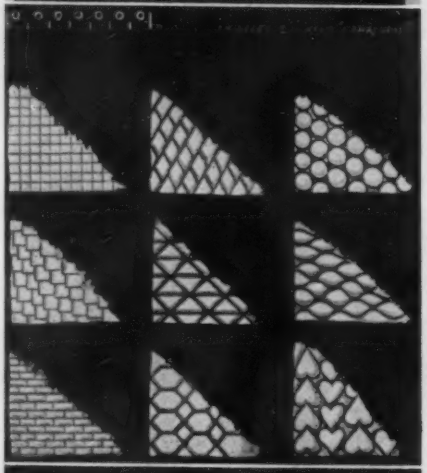
Commercial lighting installations are far advanced over the residential, but even these jobs seem unusual to us. Nowhere is there seen an abundance of fluorescent lamps. Often filament lamps are enclosed in large glass fixtures or in the more decorative locations they are built in to the structure of the buildings as seen in several of the pictures.

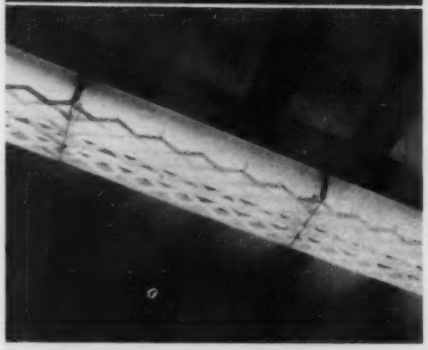
They occasionally use filament











FRANCE—In sequence from top to bottom: Table lamp, proportioned after our IES study lamps and using a bent metal tube to carry the cord and furnish support. Tube was lacquered orange, with same color carried out in the trim on the white shade. Bent tube is also used in other models to throw the light source off center and away from the base, combining a beautiful line with the functional idea of placing light where needed. Next, a perforated metal lamp shade in gilded bronze and laquered wood. Proportions such as this might prove interesting for short fluorescent lamps. Many armed ceiling fixtures of enormous proportions are used, combining different metals in totally indirect fixtures and using metal and glass. Next, sketches showing louver ideas which show some of many possibilities for creative work in light control away from the standard eggcrate patterns. Bottom picture shows a diagonally louvered fixture in an office of the Netherlands Railway at Utrecht and illustrates departure from eggcrates

lamps in long straight tubular shapes, much like our lumiline lamps, but up to 3 ft. in length. They have a group of lamps known as "Architectural Lamps." These also are filament, and come in sections to be made into circles, 1, 2, and 4 ft. in diameter.

It is in the industrial field that the most conscientious work is being done. Fuel is scarce, as is labor, and production must go on. Good lighting plays an important part, and it is here that they use all the fluorescent lamps they can get. They are making two types of lamps—the 4-ft. 40-watt and the 5-ft. 80-watt. These are made in two shades of white which correspond fairly well with our 6,500° daylight and 3,500° white lamps.

So, while the design of decorative lighting scheme is being put off for another day, they are endeavoring to do the most with what they have for the benefit of the country. They tell their public: "The fuel situation is still grave, but good lighting for seeing is always necessary and still fully justified."

France

Crossing the Channel into France is really going into another world. The differences between the two countries are enormous, and Paris is the capital of all that is foreign to Britain. Examining the lighting world was a great joy and inspiration.

To begin with it must be realized that there is much that is commonplace. Many homes have no more interesting nor bountiful amounts of light than we find in some places in this country or in England. Clear lamps are used unshaded and in small numbers. However, it is not in the least difficult to find exciting and unusual lamps, fixtures and built-in effects. Shortages are not limited to the other countries. France has them all—a limited amount of power, of lamps, as well as materials used in all phases of construction in electrical work. As this is dealing with the lighting field, the other shortages of food, clothing and shelter need only be mentioned. However trying the circumstances are the great creative genius of the French cannot be stopped.

In France they have only one type of fluorescent lamp, 3 ft. in length, rated at 22½ watts, and 1,000 lumens. It is available in three shades of white: daylight—6,500°, white 4,500°, and soft white—2,800°. They are still waiting for machinery for manufacturing the 4-ft. 40-watt lamps which we find so useful in this country. In the incandescent field, it was interesting to discover that the low-wattage lamps have a bayonet slip-in base, and those of 150 watts and above are of the screw base type, making it necessary to change the base in order to gain more light. In many bars where decorative effects are sought, they often use long lengths of fluorescent tubing in structural installations.

Whatever is available is used with great artistry and with feeling for design and beauty. Pottery of modern design is used for the bases of tall table lamps, measuring 3 or 4 ft. in height. Combinations of metals are used in well-proportioned multi-armed ceiling fixtures. Table lamps are designed with complete harmony between the shade and base. Unusual shades, unsymmetrical in line, are made of twisted sheets of parchment, giving variations in intensity as the light strikes the shade at different angles. Enormous rock crystal fixtures with drops 5 in. long and 3 in. wide are designed and displayed in the magnificent showrooms of Bagués in Paris. Decorators are vitally interested in developments of the new light sources, and incorporate lighting in their work. One of the most valuable qualities in these designers is the inherent desire for individualism.

The French cannot concern themselves too greatly with engineering facts and figures, and the lighting results produced could perhaps be improved upon when quantity and qual-

HOLLAND—In sequence from top to bottom: Living room fixture using fluorescent lamps with sides of pleated material and crosswise louvering. While the fixture is not one we would have chosen still it fits well into this room. In the dining room, interesting use is made of fluorescent lamps in a residential fixture, far from the commercial type, which fits well into the feeling of the room. Another dining room has a recessed fluorescent unit using two 1-meter tubes of about 30 watts each. There is a diffusing glass in the narrow strip beneath and open paracyl reflectors above. At the bottom is a contrast between the furnishings and the modern recessed fluorescent lighting in ceiling. Bay window seems to have recessed lighting too

ity of the light is considered. It is for this reason that they become one of the extremes. If our understanding of the technical nature of the lighting business in this country could be coupled with the aesthetic nature of the French, magnificent results would be the outcome.

Holland

The lighting work done in Holland comes nearest to the happy medium of all the European countries. There is not the jubilant feeling in the design of lighting equipment for the home, but neither is there the feeling of pure necessity. They rather enjoy making their lighting fixtures a part of their homes, such as an enclosing globe in one kitchen, dressed in a starched cotton skirt and matching the curtains at the windows.

Not being severely tied to tradition, they are delighted to experiment with the relatively new fluorescent light sources. They have set up standards for levels of illumination required for various eye tasks and conditions. They also realize that the best-laid plans for a lighting system may result in the finished job being far from comfortable and efficient if brightness of sources and surroundings are not taken into consideration.

The Philips' Lamp Co., with headquarters at Eindhoven, had most of its fluorescent equipment carried off during the war. However, they have been able to recover most of it since that time. About 25% of their buildings were destroyed, and at the time of my visit they had rebuilt 20 of the 25%. Their engineering and administrative buildings were still not ready, and the men were working in makeshift offices in attics, over cafes, etc., from one end of the city to the other. They are allowed to keep only a small percentage of their lamp output in their own country. In the fluorescent line they have a one-meter lamp of about 30 watts and a 4 ft. 40-watt lamp. With only limited materials and the small quantity of lamps at their disposal they are putting all their efforts into developing a few well-engineered installations, even though the number of them is small. With pride they show the jobs they have been able to accomplish under seemingly impossible conditions.

In each one of the European countries I visited, they were eagerly waiting news and information from this country. They read all of our published data and reports. Lighting in schools have received much attention with consideration given to the control of natural daylight, applications of light finishes throughout the rooms, as well as foot-candle levels required for ease of seeing. News of American accomplishments are published in their magazines They follow many of the recommendations which our IES has set up as standard.

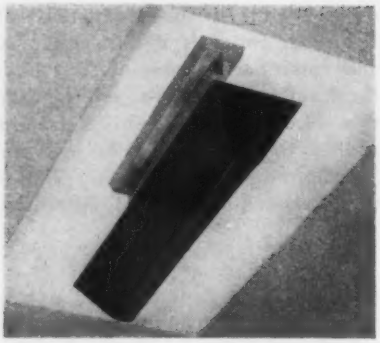
While we have much to offer them in the way of data resulting from research such as only we are able to do at this time, we can benefit equally from them: Artistic inspiration; the need for beauty; and understanding of purpose between the lighting people, the decorators and the architects; the will to fight for good seeing conditions; and individuality in approaching the problems we all have in common. England, France, Holland, Switzerland, Sweden and Denmark—each country has its own creative men and women working with us towards the goal of more ideal lighting conditions.

● Closing Date for entries to the merit award competition of the third International Lighting Exposition will be Jan. 15. An official rule booklet is offered by the industrial and commercial lighting equipment section of NEMA. It is obtainable from the Merit Award Committee, 326 West Madison St., Room 818, Chicago 6. Eligible are electrical contractors, utility lighting and power men, architects, consulting engineers, wholesaler's lighting men and a new group, owners and users of lighting. Judging will be inter-group.

● Two red searchlight beams rising in a cross over Hollywood Bowl on concert nights are acting as "stop lights" to aircraft whose motor noises used to interfere with enjoyment of musical programs. Pilots have been asked to stay a mile away from the red shafts.

Hollywood Styles Lighting Too

Using Orrefors Swedish crystal, both in circular and ornamental panels; third floor, Magnins, S.F.



Brushed copper incandescent indirect fixture used over package desks at Bullock's-Pasadena, has modern lines, gives good lighting

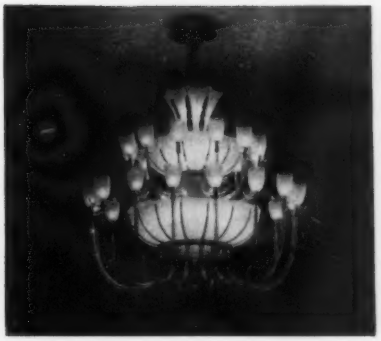
Incandescent circular fixture in Bullock's-Pasadena Coral room tea room with reflecting cove above

Combining sound illuminating principles with architectural harmony, Solar Lighting Fixture Co. of Hollywood illustrates American creative aptitudes in fixture designs for swank new shops of I. Magnin and Bullock's in San Francisco, Beverly Hills, Pasadena and in Palm Springs

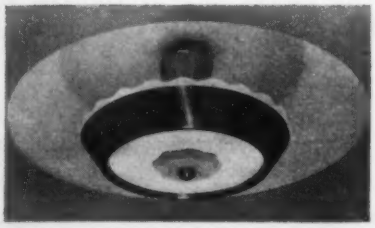
In Magnin's, San Francisco, this Jewelry shop of Laykin & Cie, has carved wood ceiling and bracket fixtures—designed in modern elegance

Carved wood candelabra and brackets are also used in Magnin's Beverly Hills, with luminous ceiling treatment over the model display cases

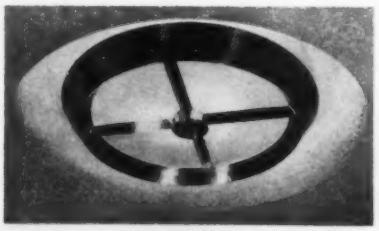
Semi-recessed fixture using plastic lens, Magnin's San Francisco, steps down brightness from the center down light by the use of a luminous ring



Luxurious atmosphere is enhanced at Magnin's Beverly Hills store by this crystal and lucite center fixture at store's first floor crossing



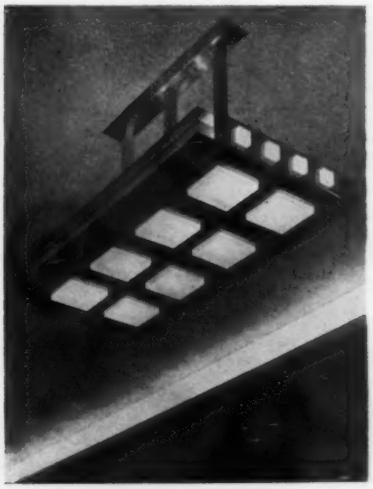
Lucite trim and bottom adapt the same design to the Collegienne millinery department, upper level



Brushed nickel incandescent fixture used in the Fur Section at Bullock's in Pasadena is different design

Rectangular lines repeated in fixture for shoe section, Bullock's Palm Springs store, together with the coves and down lighting all fit together

Large fixtures down the center of the toiletries section at Bullock's-Pasadena, in bronze and lucite, conceal spots directed at the wall murals through the decorative side louvers in the ceiling fixture

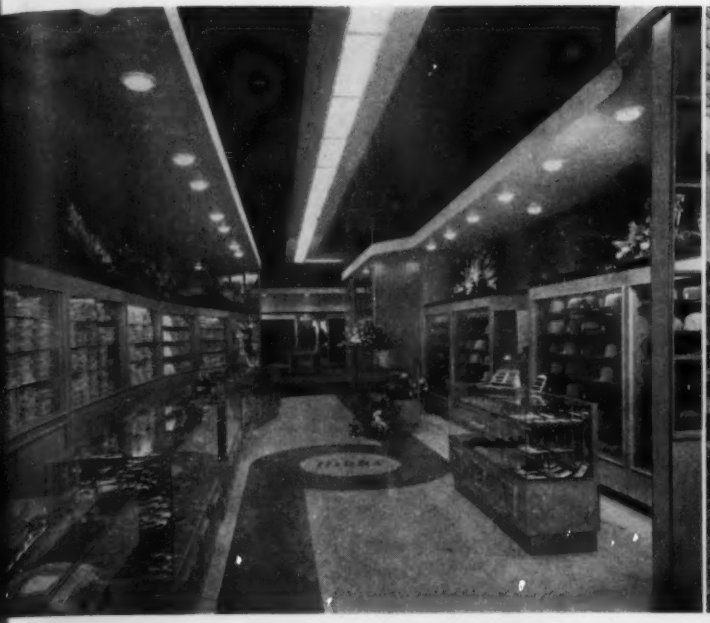


PLANNED LIGHT IN ACTION

The tools and techniques of illumination as applied in recent Western installations

Whole front of auto showroom in Beverly Hills made a show window lighted by parallel rows of Sunbeam flush-mounted F units with Holoflux lens for wide distribution

Cathon cold-cathode tubes in parallel rows made a decorative luminum ceiling at Rucker-Fuller showroom, San Francisco



Hibbs

Leddy's

Bacchus

Hibbs, Salt Lake City, reduced ceiling height by painting it dark, installed louvered fluorescent troffer in suspended partial ceiling down center, flush spots in overhang above counters, well-lighted show cases. Leddy's in Pasadena has wooden, 8 x 8 x 5½-in., louvered ceiling for full 21 x 104 ft. of ceiling, painted white with cobalt blue; lighted by five rows of 2-lamp strip flourescents 21-in. above louvers. This is supplemented by R-40 spots. Bacchus luggage in Seattle is example of lighting by indirect coves only with higher levels provided in showcases and over counters from overhanging skylight of opalescent glass. Lewis & Lewis, Oakland, is provided switching by contactor control so sales people can show rugs either under fluorescent ceiling troffers by Peerless with Corning lens, or incandescent 300-watt units behind lens plates, or both. Romaine Myers designed it. Atkins, San Francisco, uses standard Leader fixtures in pattern arrangements for its women's store

Lewis & Lewis

Atkins

In building new schools in the Southwest, particularly California, designers have striven to make full use of daylight for illumination. In some cases this makes difficult the handling of supplemental artificial illumination. At Malaga Cove school, Palos Verdes, Calif., a skylight facing south, with louvered ceiling below was installed, the louvers cutting out the direct rays of the sun. Note how the Silvray concentric ring incandescent fixtures were mounted. In this 30 x 32-room there were nine 500-watt silvered bowl lamps used. Germicidal units were also installed above the chalkboard level

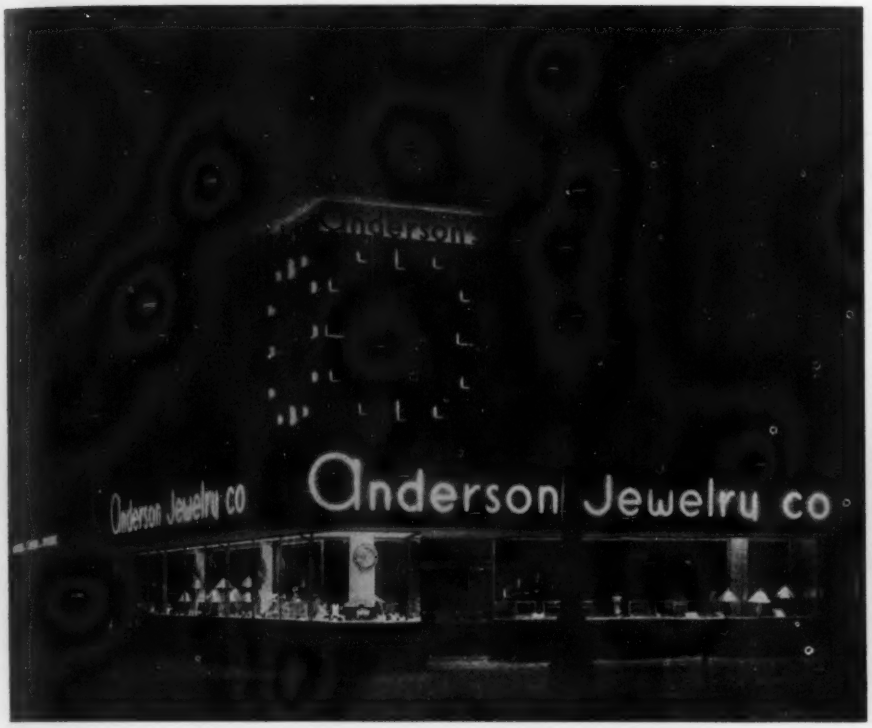
TO SUPPLEMENT DAYLIGHT IN SCHOOLS

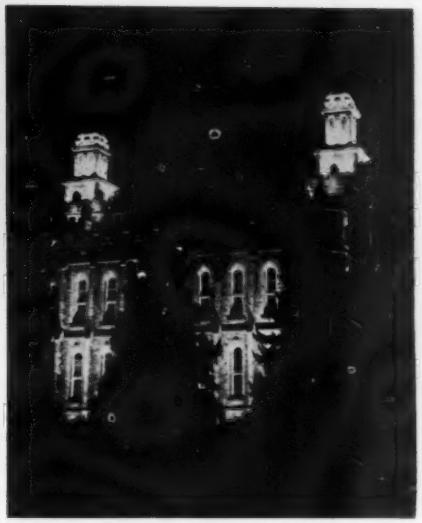
Northern California Electrical Bureau has installed model lighting in experimental classrooms in Chico, Enterprise, Sacramento, Redwood City, Ceres, and the two above, in Commodore Stockton School, San Francisco in Chinatown. In the room above 12 200-watt, URC fluorescent units with Albalite glass panels were installed. Germicidal units were also installed, two 30-watt units to room

The test classrooms are being studied jointly by the State Division of Schoolhouse Planning, the school boards involved and by the electrical industry to determine relative costs, effectiveness and maintenance required for both fluorescent and incandescent systems. The above has nine 500-watt, silver bowl lamps in concentric ring louvered fixtures. Wall colors are studied

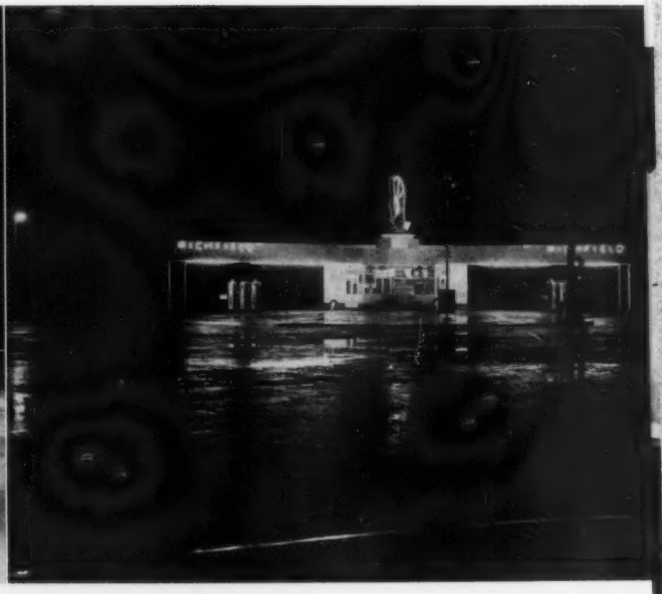
LIGHT IN ACTION

FOR ALL OUTDOORS





The exterior of an entire business building is now treated as a unit and its lighting treatment is part of the architectural dress, as illustrated in the Salt Lake City building shown above. The silhouetted clock face and the windows work in harmony. By contrast, floodlighting can bring drama to a building whose architecture is of the past, as Westinghouse did to the Logan Mormon Temple shown in picture at right



Horseshoe courts for a national tournament last year at Murray, Utah, were lighted by two Westinghouse open-type reflectors on 22-ft. poles, seven poles to each side, for 18 courts. With 1,500-watt lamps they provided 50 f-c on the ground. Installation was made by Wasatch Electric Co. from a layout by Al Leick of Utah Power & Light Co. The contestants came from all over the U. S.

Gas service station lighting uses all kinds of techniques to gain attention and make the station attractive to passing motorists. This Richfield station in Los Angeles put in the first job of slimline lamps in Allen & Olson fixtures under the canopies. The slimline lamps offer many advantages for outdoor uses, being unaffected by cold. This station is on Riverside and Fletcher drives

FOR STREETS AND AIRPORTS

Broadway, Los Angeles, has just had obsolete luminous arc lamps replaced by two 16,000-lumen mercury in G-E pendant units mounted 28 ft. high. These units cost less to operate by 20%

Portable air force squadron equipment with 10-watt lamps and No. 16 conductor cords gave poor service and Ontario, Calif., installed new Line Material medium intensity elevated runway lights. Roy Dahlin, So. Cal. Edison Co., George Sanford, airport manager and Roy Bowles, mayor, inspect one

While the above is not strictly safety lighting improvement (it does give 2 f-c on the street as compared to .31 before, however) Los Angeles has an extensive program of relighting all dangerous intersections and heavy traffic streets, much of it by modernizing old posts with new, more efficient equipment. It has converted 21.6 miles in two years, plans a total of 275 miles for the whole job

Approach at night looks to pilot like this now. Control tower has a 5-kva. transformer unit with brightness control panel. New units use 45-watt, 6.6 amp. 6.8-volt, T-10 clear prefocused base lamps; are equipped with new Kopp lens. This is first Coast installation

On the edge of Los Angeles, in Beverly Hills, a part of La Cienega Blvd. has been relighted with Westinghouse "football" mercury units. It is a street lined with restaurants and traffic on it is heavy. The new lighting on this busy street contributes to the safety of the pedestrians and helps to cut down on "after-dark" accidents

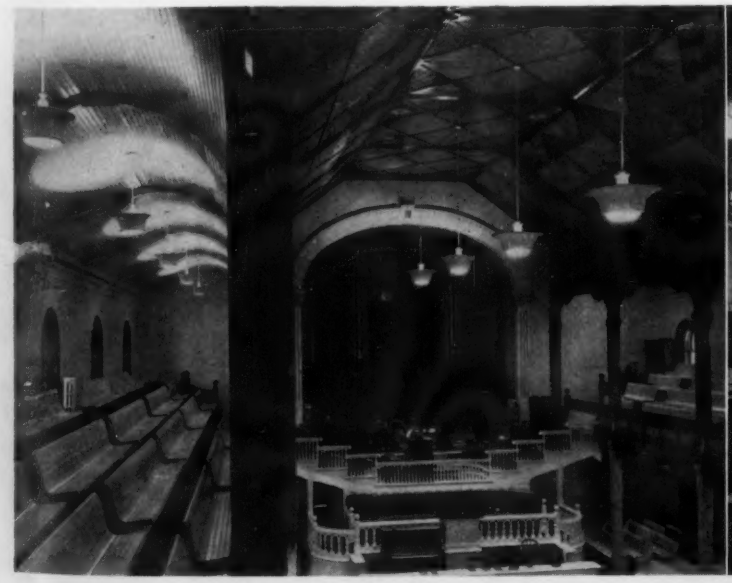
LIGHT IN ACTION

—IN PUBLIC BUILDINGS

First National Trust and Savings Bank, Santa Barbara, typical of many buildings where beamed high ceilings make adequate illumination of working areas difficult structurally and aesthetically

New lighting now consists of four rows of 12 fixtures each, made by House of Light, Whittier, using four 200-ma. slimline lamps, 4,500 K in the 51 x 97½-ft. room, 19 ft. high. Mounting is 16 ft. to floor. After 100 hours of burning work space intensity is 50 f-c, lobby 32 f-c, average room intensity 41 f-c. Louvered fixtures go well with the interior design of this beamed architecture

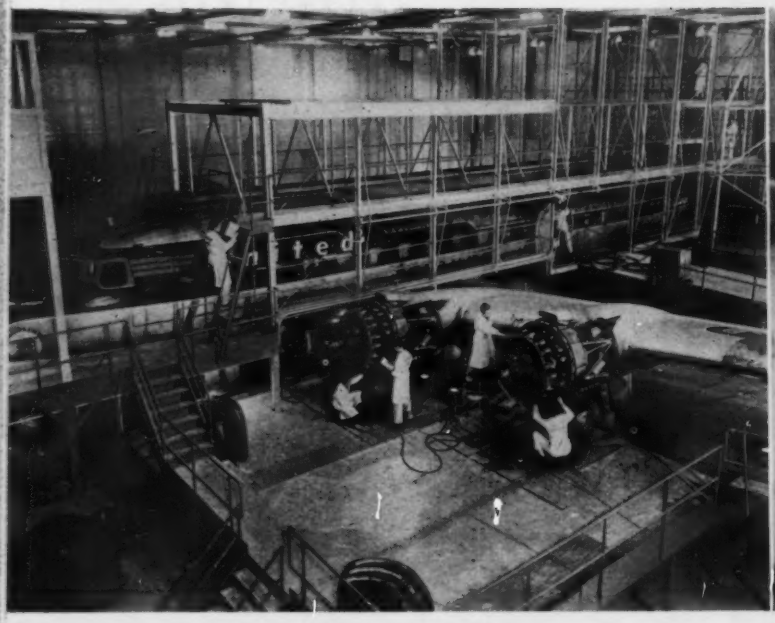
Before relighting the bank had tried fluorescent commercial fixtures suspended from the ceiling over the working areas as shown above but results were spotty and unsatisfactory. There was not sufficient illumination over the public area; appearance was poor. Same room after relighting is shown at left



Bear Lake tabernacle of the Mormon Church at Paris, Idaho, had its lighting modernized by L. B. Gawan, engineer, who had Sechrist of Denver make 1,000-watt units employing Holophane high-bay industrial incandescent units shielded as shown. Fixtures fit the interior architecture and deliver 25 f-c for the congregation

Dark ornamental wood carvings in a 35-ft. ceiling required 10 special Wagner-Woodruff, 12 40-watt and 4 20-watt fluorescent lamp fixtures, which raised previous 3 f-c to 32 f-c and fixtures fitted into the ornamental treatment of the large room in Ventura bank

INDUSTRY

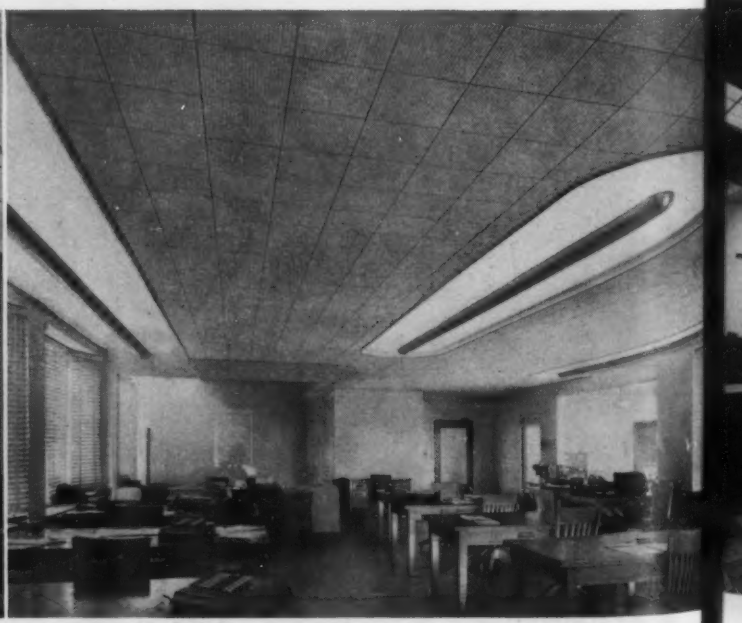


"Push button dock" is what they call this electrically operated maintenance and repair dock at United Air Lines, San Francisco maintenance shops. Catwalks operate electrically. Floor units light wing undersides

Besides the general lighting from high-bay triple units of two incandescent and one mercury lamp, and some fluorescent in low ceiling areas, most machine tools have local lighting and three-dimensional painting

OFFICES

Believing in his own medicine, Carl Martin, Benjamin Electric & Mfg. Co. Western manager, has Sky-glo plastic louverall ceiling in San Francisco offices. Hidden are 8 rows of 2-lamp industrial RLM reflectors

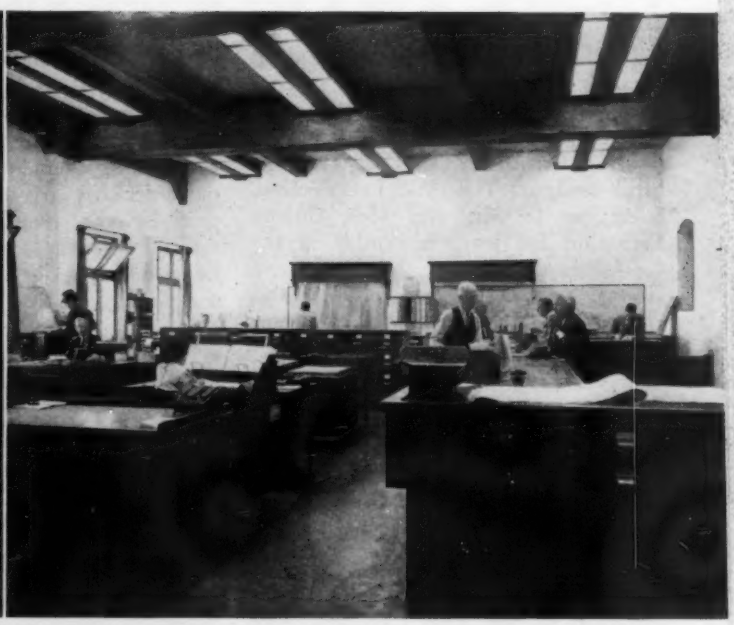


Novel indirect fluorescent lighting troughs of brushed metal suspended in white plastered coves set into Acoust-Celo-tex ceiling in Almond Growers Assn. office, Sacramento. George C. Foss was contractor

Pacific Press, Los Angeles, where Life and Time are printed for Western mailings, is lighted by continuous rows of Smoot-Holman industrial 2-light units for even general illumination. Note trouble lamps on reels

Sweeney, Krist & Dimm, color printers of Portland, made sure future changes in floor layout would not be difficult to light by providing plenty of extra light outlets in the ceiling and the bus duct distribution

High-beamed ceiling in Southern California Building & Loan Co.'s Los Angeles office proved a lighting problem until these "skylight" fixtures of fluorescent lamps and glass were fitted in bays between beams



Old mission atmosphere is appropriate in Santa Barbara but today's work needs good illumination. Without detracting from atmosphere, Wagner-Woodruff, L.A. designed fixtures to straddle beams of court house

Light Talk

● HAWAIIAN ELECTRIC CO., working in conjunction with the University of Hawaii Extension Service, conducted a lighting improvement contest at the annual Oahu home demonstration achievement day program. This contest culminated a series of lessons in lighting to university extension clubs, attended by 750 women. The contest was one to light a bedroom properly and economically. Contestants rooms were scored before making improvements and after, rated on percentage of improvement, money spent. The winner scored 100 points against a previous 22, spent $43.15 for the job, $8 of which was in paint. It included raising lighting unit, shielding, additional outlets and background color changes to improve reflection, without glare. Last year's project was on living room improvement; next year's will be the kitchen. Hawaiian Electric furnished prizes for the winners. Erma Meeks, home economist for the utility, gave the class training.

● ABSTRACT ART on tour is being employed with surprising results by the Miller Co., lighting manufacturing firm, as a means of reaching art-conscious architects and designers and thus opening the door to sell built-in lighting fixtures as part of architectural design. The Miller collection, belonging to Mr. and Mrs. Burton Tremaine Jr., was on exhibit in the California Palace of the Legion of Honor, San Francisco, in July and viewed by art students, artists, architects and designers.

● HOW A GOLF RANGE should be lighted is well treated in the *Golf Range Operators' Handbook*, published by the National Golf Foundation, of 407 South Dearborn St., Chicago 5. In a section headed "Illumination" it has sketches showing lighting layout and equipment and pictures of the installation at San Jose Fairways, San Jose, Calif.

● SPORTS LIGHTING STANDARDS are available in letter-sized sheets from National Electrical Manufacturers Assn., grouped several to the page, with drawings of typical layout and tables of standard equipment required for the task. There are layouts for archery, badminton, baseball, softball, bowling green, croquet, boxing and wrestling, football, tennis court, ski slope, soccer, swimming pool, trap shooting and volley ball.

● A COLD-CATHODE Fluorescent *Lighting Guide* is now available from the Fluorescent Lighting Assn., of 501 Fifth Ave., New York, which also issues a monthly news bulletin of its activities. The Guide contains basic information on cold-cathode lighting and light sources, technical data on photometric measurements and circuits. It also lists manufacturers of equipment who are members of the association.

Recently James Maule, Graybar, Los Angeles, demonstrated the full line of lighting equipment to Edison salesmen

● A POCKET SIZED CALCU-LIGHT-OR for making quick estimates of illumination either by the lumen or the point-by-point method without further tables or charts, is put out by Westinghouse Electric Corp., which sells it for a dollar.

● WHEN THE NATIONAL COUNCIL of Schoolhouse Construction meets in San Francisco in October, Charles H. Burch, chief of the California State Division of Schoolhouse Planning, will present the results of surveys of California schools as to brightness and intensity readings in classrooms, with particular attention to the so-called "daylight" lighted schools. These tests are now being carried on by John Lyon Reid, architect, and John Walsh, illuminating engineer, PG and E, in the northern California section; and by Foster Sampson, illuminating engineer, and Henry L. Wright, architect, in southern California, with the assistance of Charles Gibson, of the California Division of Schoolhouse Planning.

● TRAFFIC FATALITIES after dark are reported reduced 72% in Los Angeles, 91% in Salt Lake City and 71% in San Francisco on streets where street lighting has been modernized. The national average is 76% and entailed an increased cost of only $0.67 to $1.17 per capita per year. Adequate lighting is estimated to cost only $2 to $2.50 on an annual per capita basis. The additional cost from the average of $1.33 now spent is said to be minor compared to the cost of life, and accidents, property damage, insurance and crime.

● GERMICIDAL LAMPS are specified by the Veterans Administration for the additions to the tuberculosis hospitals now being built for it, among them the one at Livermore, Calif. The ultraviolet lamps will be used in dining hall, recreation room and other areas where patients congregate, to kill disease-carrying germs in the air. The idea is to reduce the chances of spreading tuberculosis in TB hospitals operated by the Veterans Administration.

● A SECOND EDITION of the *RLM Specification Guide* has just been published by the RLM Standards Institute, 326 W. Madison St., Chicago 6. It is a 36-page booklet giving detailed specifications for 14 of the most commonly used incandescent and fluorescent units.

● COMPARED TO THE COST of other equipment in a merchandising store, lighting is very small. In one bay of a store, 20x20 ft. in size, it is not uncommon for carpeting to cost from $250 to $300; showcases and display units from $200 to $2,000; paint from $40 to $60; and lighting, all too often, $120—four units at $30 each. Yet lighting is one of the major factors contributing to the sale of goods.

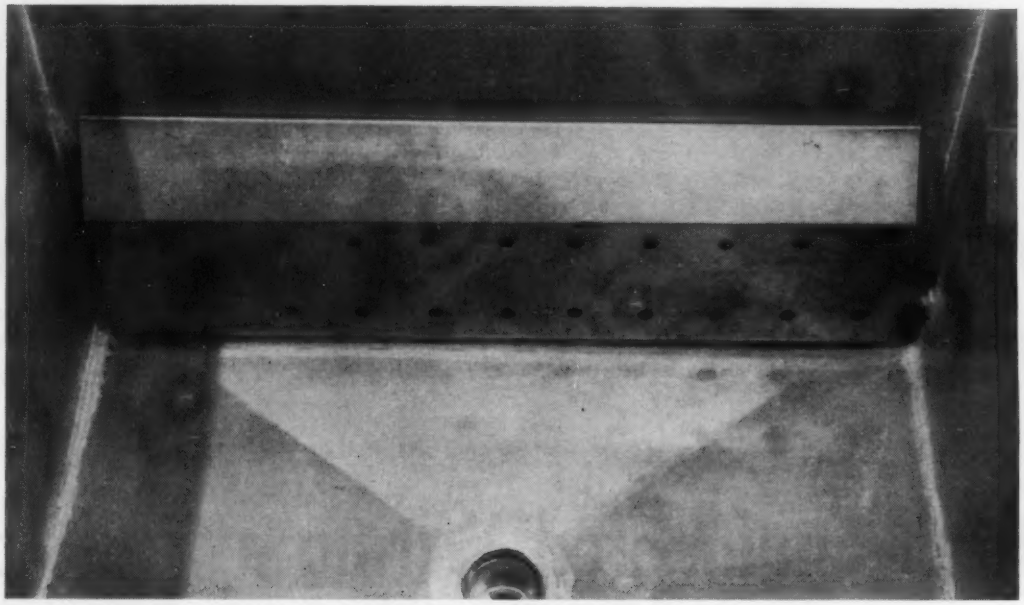
● JUST HOW AND WHAT it does in the certification of lighting equipment is told in a booklet recently issued by the Electrical Testing Laboratories, 2 East End Ave., New York City. In addition to the general program there is included information in separate inserted booklets about certification of Fleur-o-lier fixtures, ballasts and starters, certified floor and table lamps, and RLM standard lighting equipment.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 50

SUBJECT: Dish Sterilizer
CUSTOMER: O. K. Lunch
TYPE OF OPERATION: Restaurant
SERVICE COMPANY: The Washington Water Power Co.

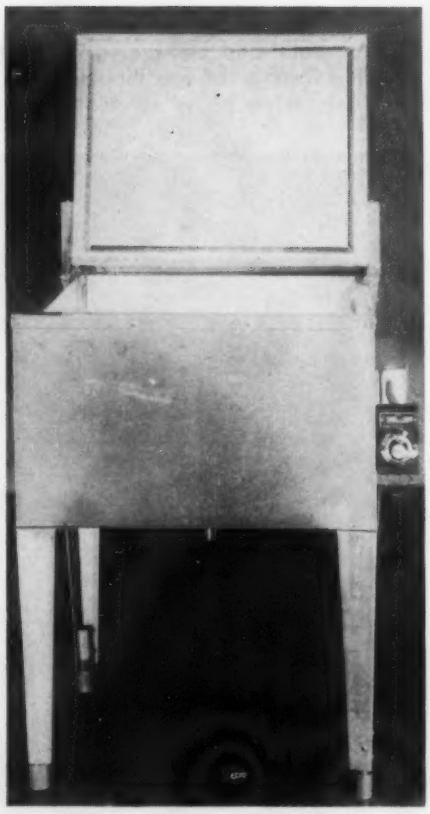
Prepared by Alec Godfrey
Commercial Representative



Effective sterilization of dishes at nominal cost is a problem with small restaurants which do not use mechanical dishwashers. Further, under Washington State's Rules and Regulations of the Board of Health and Sanitation, Method 1, Item 10, it is specified that all utensils should be immersed for at least two minutes at a temperature of not less than 170° F., and that equipment must be capable of maintaining a water temperature of 170° F. during hours of operation.

The vat illustrated was designed by the sales manager of Matthews & Kerr Inc., restaurant supply house in Spokane, to meet these requirements. Outside dimensions of the vat are 2 ft. square by 16 in. deep, of 22-gage stainless steel. Interior is 20x20x14 in. Walls and hinged cover are insulated with rock wool. A 3-kw. immersion heater provides the heat. The heater is installed along the rear side of the vat and is protected by a stainless steel guard as shown. An adjustable thermostat controls temperature.

A 30-day test showed a consumption of 597 kwh. Temperature was maintained between 175° and 180° during this period. A drain is connected to the sewer. The device is supplied with 120° to 150° water from the hot water source that provides water for other uses in the restaurant. Dishwashing is all done by hand before sterilizing.

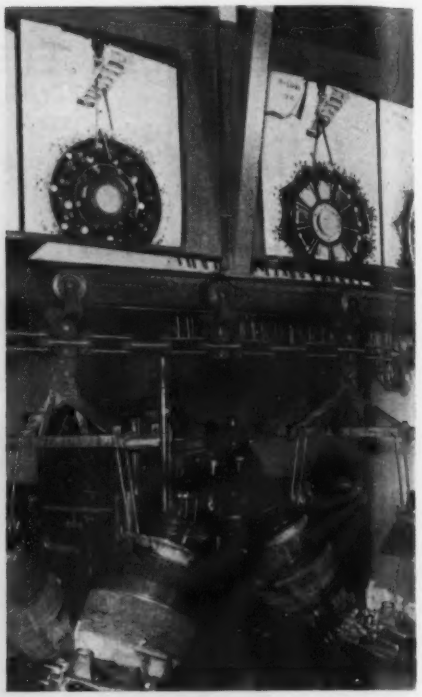


Customer Advantages

The restaurant operator has indicated the advantages, in addition to compliance with health regulations, as: (1) reduced breakage; the dishes are placed on racks after washing; (2) reduced labor; the heat from the dishes sterilized at a temperature in excess of 170° has completely eliminated the need of wiping dishes.

Operating Data

Meals served per day on premises	550
Meals served per day for off-premises consumption (dishes furnished)	300
Hours of operation per day	24
Kwh. used by sterilizer per month (approx.)	600



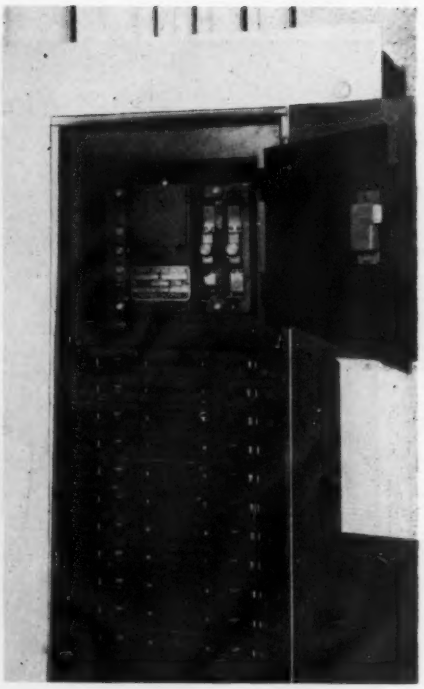
New maintenance base for United Air Lines at San Francisco municipal airport. United's entire nation-wide fleet of planes will be serviced here. Plant has an electrical load of 2,900 kva. One of the many mono rail parts conveyors at United shops (right). Photographs above conveyor show proper method of suspending various parts for transport

Well-Engineered Wiring at United

IN THE ultra modern San Francisco service shops established by United Air Lines for maintenance of its nation-wide fleet of airliners is to be found an electrical installation in keeping with the modernity of the shops and the aircraft it serves. It is one of the few industrial plants in the West where all power and lighting (2,900 kva.) is distributed at primary voltage of 4,160. In common with others it uses dry-type transformers and bus duct extensively. It is distinctive in the use of a 120/208-volt, 4-wire wye-connected system for both power and lighting throughout.

Two primary loops feed seven 500-kva. dry-type transformers, three on one and four on the other, to serve the main shop areas with the 120/208-volt 4-wire service mentioned. Radial feeders for power and for lighting emanate from these substations. Many of the power feeders terminate in bus duct runs to feed the numerous motors. Four-wire lighting feeders run to the many panelboards. Lighting panelboards are provided with 200-amp. remotely controlled main con-

Typical metal-clad 500-kva. dry-type transformer unit. Seven such stations are supplied from 4,160-volt loop feeders. Transformer secondary is 120/208 volts, four-wire, three phase serving both lighting and power feeders in the plant



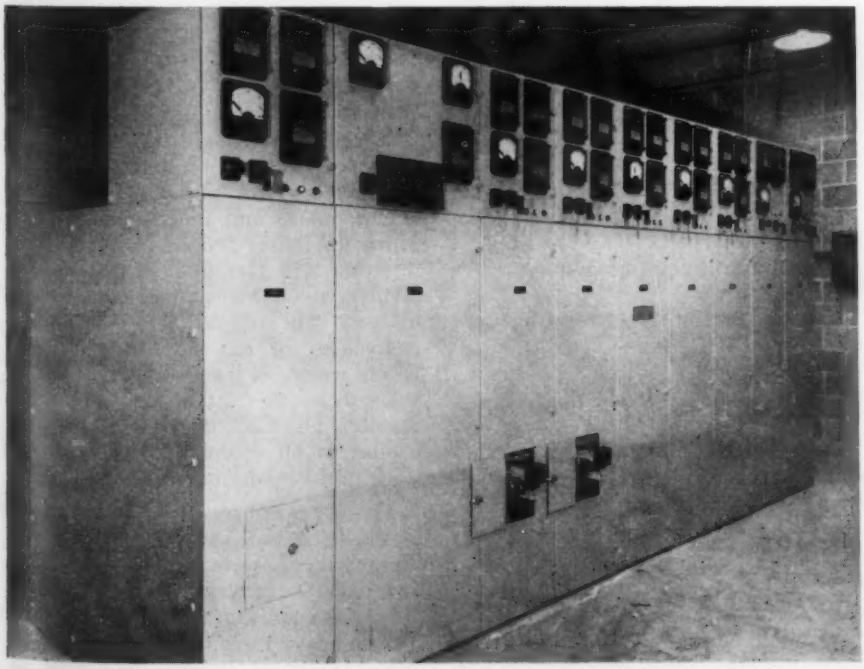
Extensive use of bus duct provides power wiring flexibility at United Shops. Conduit feeder run to 500-kva. dry transformer is shown tapping bus duct at right center of photograph. Breaker-type lighting panelboard (right) showing 200-amp. contactor at top for remote control of lighting in large areas; saves individually switching circuits

tactors so that the lighting in entire areas can be controlled by the operation of only one switch.

Service to the main switchboard consists of a 750-MCM 4-wire, 4,160-volt circuit feeding the main bus through a 1,200-amp. air circuit breaker with interrupting capacity of 50,000 kva. Seven 4,160-volt feeders, all with 600-amp. air circuit breakers of 50,000 kva. interrupting capacity, emanate from this board to serve the various buildings and shops of United's new maintenance base.

The two primary loops mentioned have a single feed from the main board to the point where the loop is tapped. Switching provisions are made on the loops so that any one transformer-substation can be down without affecting service to the others. No provision was made for networking the secondaries of the 500-kva. transformers nor for automatic loop switching as the expense was not considered justifiable for the type of operation involved.

Main service board distributes 2,900 kva. at United maintenance shops at incoming voltage of 4,160. One main 1,200-amp. and six 600-amp. feeder breakers are of the air type. All have interrupting capacity of 50,000 kva.

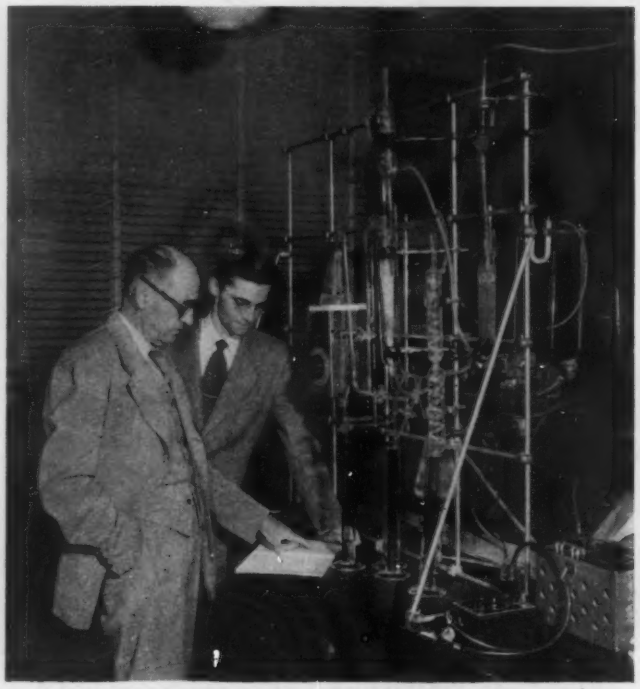


All large motors are fed directly from the high-voltage distribution circuits. These include air compressors for the shops and blowers for the test cell building where engines are tested after servicing. To supply the dust-free air required in the instrument room an electric air precipitator is used.

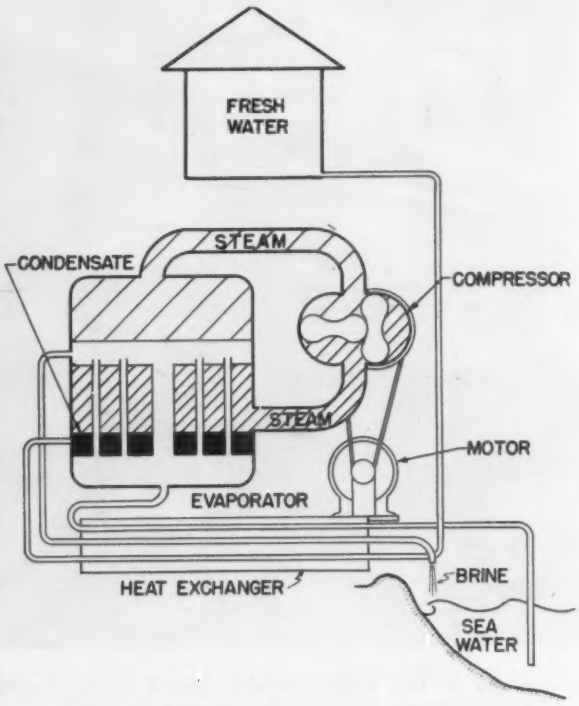
With only a few exceptions, fluorescent lighting is used throughout. Shop areas have a general level of about 50 f-c. Office space, drafting room and certain special operations were provided with 60 f-c. and upwards. In hangars, high-bay lighting consisting of combination 3-light mercury and incandescent units is used.

Machine tools are painted in colors for so-called 3-dimensional lighting. A high level of fluorescent general lighting is supplemented by adjustable local incandescent lighting on the individual machines. Photographs and some further information on lighting are contained in the special lighting section of this issue.

E. L. LaPointe is design engineer for United; Scott-Butner of Oakland was electrical contractor.



Prof. W. F. Langelier and W. B. Lawrence of U. C. at Berkeley, with laboratory distillation equipment used for research investigations on scale and corrosion



Diagrammatic sketch of typical compression distillation unit

PACIFIC OCEAN — "CALIFORNIA'S LAST WATER HOLE"

R. G. Folsom*

CONSIDERING the over-all picture of water situation in California, it is clear that future development may be expected to be retarded or limited due to lack of water. Available courses of action indicate consideration of three possible general methods of attack—increase the net available water, increase the re-use of water, or reduce losses. Increase in available water may be accomplished by:

1. Better works for water conservation.
2. Importation of water from outside the state.
3. Production of water from presently unusable sources—vacuum distillation, pressure distillation, chemical treatment—of sea water.
4. Control of the elements to increase rainfall.

The re-use of water considers:

1. Drainage from irrigation.
2. Treatment of sewage.
3. Treatment of industrial wastes.

The reduction of losses includes:

1. Eliminating leakage from conduits and reservoirs.
2. Using minimum amount of water for given purpose.
3. Evaporation, transpiration and other types of losses.

Better Works For Water Conservation

Construction and operation of a coordinated water plan for various principal basins of the state will be necessary to achieve optimum water supply. As an example, in the California Central Valley, the interested groups to be coordinated are the state, U. S. Engineers, Bureau of Reclamation, irrigation districts, municipalities, power companies and individuals. To coordinate these groups with diverse interests is a Herculian task that will involve inevitable compromises which in turn will reduce the over-all effectiveness of any coordinated plan. When water is transported from one basin to another, additional difficulties develop. The California Central Valley project is an example of the type of work and operations necessary.

The water conservation activities, as in southern California and the Santa Clara Valley, are examples of attempts to reduce water wasted through runoff to the sea during the wet season or sudden heavy rains. In Orange County,

* Professor of Mechanical Engineering, University of California. Abstract of paper presented before meeting of Pacific Coast Electrical Assn., San Francisco, June 16-18, 1948.

additions to the underground storage is necessary to stop salt water enroachment due to the serious overdrafts in the supply made by pumps, particularly in dry years.

Control of Elements

Many proposals have been made for controlling precipitation from fog or rain clouds. Recent experiments on a prototype scale have demonstrated the possibilities and limitations of producing rain from suitable types of clouds. Californians might study the many aspects of seeding clouds with carbon dioxide pellets to produce rain. If this were to be attempted on a large and continuous scale, one wonders about the complicated court proceedings that would develop with Arizona and Nevada as plaintiffs in a case against California because the rain-making activities would reduce the natural rainfall in the eastermost states and result in economic, moral and political ruin. Investigation on the precipitation of fog are for the purpose of removing the hazards to transportation facilities rather than recovery of water, since the amount from this source is small.

Importation of Water

The Metropolitan Water District Aquaduct in southern California was designed for a maximum capacity of 900,000 acre-ft. per year. This amount of water plus that from the Mono Lake and Owens River Aquaduct with developments of 400,000 acre-ft. per year, is insufficient to meet the ultimate demand of the southern California basin. In addition, present political and legal actions may prevent the development of the Metropolitan Water District facilities to the planned capacity.

An aquaduct to transport Columbia River water to southern California has been proposed. This undertaking would involve an enormous sum of money and many years of work. The aquaduct would be about eleven hundred miles in length, about the same as the Great Wall of China, and would involve many pump lifts. Surplus water would be diverted from the Columbia at a dam in a region above Astoria, transported south along the coastal plain of Oregon to the Klamath and Trinity rivers, pumped across the mountains through a tunnel near Weaverville and discharged into the headwaters of the Sacramento River, flow south in the Sacramento River channel, pumped across the delta and into the San Joaquin water shed, and pumped through a tunnel under the Tehachapi Mountains into the Los Angeles region. Such a grandiose scheme may have value at some period, but it appears to be beyond the scope of practical construction for the immediate future.

Re-Use of Water

Re-use of treated water from sewage disposal plants has been investigated in detail by many authorities. It must be remembered that the total water possible to recover from this source is small compared with expected deficiencies in the total irrigation demand. In spite of the psychological hurdles, treated sewage water is being re-used in many parts of the world, including California, and this may be the solution of some domestic supply problems. Satisfactory treatment of industrial waste water may prove more difficult.

Reduction of Losses

In addition to stopping ordinary leakage from any water system, evaporation, transpiration and other hidden losses should be reduced to a minimum. In irrigation applications more consideration should be given to the amounts of water, frequency and time of irrigation. It is possible that night irrigation may be required to eliminate daytime evaporation losses due to heat from the sun.

Sea Water

In the hunt for new sources of water for the state of California one naturally turns to the Pacific Ocean—an infinite supply. No matter what the ultimate population's water demands on the state would be, the ocean represents a source which could meet any and all requirements. As described by some: "The Pacific Ocean is California's last water hole." This source, which is salt water or brackish, must be treated in such a way as to remove salts to a concentration less than an amount detrimental to human and plant life. Many methods are available for doing this. However the economics of each method, when applied on a large scale, have not been investigated to the extent desirable in order to form a conclusion regarding the application of the methods for large-scale operations.

The two general methods of treating water may be grouped under the headings of mechanical and chemical. The chemical treatment involves the precipitation of the salts and separation of solid material leaving the water sufficiently pure for normal usage. Chemical desalting methods are based on three operating principles: precipitation, ion exchange, and a combined ion exchange and precipitation. The mechanical type of treatment involves distillation processes of one type or another.

In the mechanical treatment, distillation may be achieved by multiple-effect evaporators in compression distillation. The latter process has been known for about 100 years, although applications in the United States have only become important during the recent World War when we produced enough small units to supply pure distilled water for the daily needs of over a million men. This type of unit is sometimes referred to as the "Kleinschmidt Still."

In the normal single-effect evaporator, heat is added to a body of water producing steam which is then drawn off to a heat exchanger where the steam is condensed to pure distilled water. Such a simple system has been known and used for hundreds of years. In order to increase the efficiency of such a unit, multiple effects are used. In this latter process the condenser of the first stage forms the boiler of the second stage from which the steam at a lower temperature and pressure issues, then passes to a second condenser and is discharged as pure distilled water. The second condenser then forms a boiler for the third stage, such process repeating itself as long as sufficient temperature differentials are available to produce economical rates of heat transfer and to the ability of the operator to make an initial investment in equipment. The multiple-effect evaporators are familiar to most high-pressure steam plant operators. Rough cost estimates for a very large plant with five stages on 24-hour-a-day operation for 300 days a year indicate a cost of water produced at the plant of about twelve cents a ton. This cost figure may vary widely depending on the source of heat, the type of financing, depreciation of equipment and the number of effects used.

The compression distillation plant consists of three principal elements —the compressor, evaporator and heat exchanger. The operation of the unit follows closely that of a normal household refrigerator except that the latter is a closed system and the former is an open system. In the refrigerator the refrigerant is continuously circulated inside of the equipment where the compressor increases the pressure of the refrigerant and forces it through the system—the heat exchanger removes heat from the refrigerant and transfers it to the outside air and the evaporator absorbs heat from the box or area to be refrigerated and adds it to the refrigerant which in turn is pumped by the compressor to the heat exchanger in order to transfer the heat to the outside. In the distillation system there is a continuous addition of raw water

and a continuous drawing off of brine and pure distilled water. In operation the raw water (seawater) passes through the heat exchanger where it absorbs heat from the distillate and brine which in turn is discharged from the system at a temperature slightly above that of the incoming raw water. The hot raw water passes to the evaporator where it mixes with a relatively large volume of recirculated brine and heat is added. Steam is then formed at or slightly above atmospheric pressure and is drawn off to a steam compressor which is similar to an air compressor, which raises the steam pressure by about three pounds per square inch and 10° F. The output from the steam compressor passes to the other side of the evaporator where it is condensed by the removal of heat which is used to create steam from the incoming mixture of raw water and brine. The steam then passes to the heat exchanger where it is cooled and discharged from the system as the distillants. In the portable equipment manufactured for Army and Navy purposes, the optimum performance appears to be between 175 and 200 pounds water per pound of fuel, such fuel including the mechanical power to drive the compressor. For each one and a quarter pounds sea water at 60° F. fed to the system, there is a production of one pound of fresh water at 70°F. and one-quarter pound brine at 80°F. Roughly the system requires about one tenth the power and heat of a single-effect evaporator.

The major problem in the operation of a compression distillation unit is the scaling which occurs in the evaporator and heat exchanger. The distillation results in an increase in the concentration of the mineral salts in the brine, which have a tendency to form scales which materially reduce the amount of heat transfer across a given tube. The removal of this scale is difficult and expensive, and is one of the major stumbling blocks in the operation of the equipment. An intensive study of this phase of the problem is now being undertaken by Prof. W. F. Langelier of the University of California College of Engineering at Berkeley.

A suggestion has been made that distillation of properly treated sewage effluent would overcome psychological resistance to the use of such water and at the same time eliminate the scale problem inolved with seawater. As noted previously, the total amount of water to be obtained from sewage effluent is insufficient to meet the predicted deficiency demands. On the other hand, results of tests by reliable agencies have shown that proper distillation produces a satisfactory product sufficiently low in bacteria count to be suitable for domestic purposes. Although the amount of water to be obtained is small, this type of water source should not be neglected entirely as it may be suitable for some isolated emergency applications.

Compression distillation units have been improved tremendously in the last few years. When initially introduced about a hundred years ago, jet compressors were applied with the result of about 15 pounds water per pound of fuel. Later improvements using reciprocating compressors raised this rate to 35 pounds water per pound fuel, and the recent developments making use of a positive displacement rotary compressor have attained a figure between 175 and 200. These units have all been small and the amount of engineering investigation devoted to the design of large units has been restricted. It is believed that the application of high-efficiency centrifugal or axial compressors similar to those used in gas turbine units may be helpful in increasing the performance and reducing the initial cost.

Several authors have estimated that water could be produced at a large distillation plant (compressor and auxiliaries requiring about 12,000 hp. plus heat) for about five cents per ton. Rough estimates confirm this figure and at the same time indicate some possibility of lowering the cost through certain proposed modifications in the equipment. If the five cents per ton figure is correct, it should be noted that this price is less than the cost now charged by some distributors to bulk users of domestic and industrial water.

The compression distillation method usually requires some heat in addition to the mechanical power input to the compressor. The compressor may be driven by any suitable means and the heat may be added from any suitable source such as gas or oil combustion, electricity, nuclear energy reactions, or solar radiation. For sources of mechanical energy other than ones in common use today, there is the possibility of applying wind power, wave power, or power due to the tides. This wide range of energy sources has been mentioned because there are many articles appearing in the daily and technical press regarding the application of these sources to the production of water. Although most of these suggestions will work theoretically, their actual application is uneconomical due to the large investment necessary in order to collect a sufficient amount of energy to use for usual purposes. Winds, waves, tides and solar energy are available in vast amounts and prove intriguing to the theoretical investigator. The practical operator, on the other hand, is faced with a tremendous task of building equipment large enough to collect a significant amount of power. As an example, one can consider the 100-ft. diameter propeller mounted on Pilot's Knob in New England for wind generation of power which has a maximum capacity of 1,000 kw. Also it has been found that it takes many square feet of heat-absorbing surface per horsepower to obtain energy from solar radiation. Schemes of inventors using these types of energy must be looked at with care.

Some authors have indicated that the era of aquaducts is at an end in that we should now produce water by mechanical systems and give up the building of long aquaducts. At the present time such procedure seems economically possible in certain situations. However, everyone must remember that our fuel and energy sources are limited and that, if we are going to use them to produce water, it will mean that we will have to go without some other necessity or convenience. Already within the state of California, which is an oil and gas producing center, we are importing gas in large quantities and considering the importation of oil. Present knowledge regarding the total amount of energy available from nuclear sources indicates that this is rather limited and it becomes a question regarding efficient application of this energy if it should be applied to the evaporation of water. The larger aspect of the economical use of our known available energy supplies requires an investigation of a magnitude many times greater than that available in the scope of this discussion.

The success of various sea water treating systems will depend upon the quality and cost of the resultant product. It is almost impossible to arrive at a reasonable minimum or average cost of bulk water for different localities in an area the size of the state of California. Prices appear to vary radically and it is somewhat difficult from the available figures to deduce a bulk price which does not include the cost of the domestic and industrial distribution system. The minimum bulk price may be in the neighborhood of a little less than three cents a ton, or roughly half the price of distilled water produced by a large compression distillation plant. Costs with respect to chemical treatment are not sufficiently known at the present time other than that they appear to be of the same order of magnitude. Since treatment of sea water should be applied only in dry seasons, the plants would not be in continuous operation and thus the price of each unit of water actually produced would increase. The amount

of this increase would depend upon the local conditions.

Summary

On the basis of past history, it appears reasonable to assume that the ultimate population of the state of California will be in the neighborhood of 20 million people provided that sufficient water is available for all purposes including a supporting agricultural economy. Rough estimates indicate that the amount of water produced from natural resources within the boundaries of the state and the amount of water that can be transported into the state are insufficient to meet the ultimate demand. Indications of the seriousness of the water problems have taken place in several localities in the last few years, particularly this last season when the rainfall was unusually late. Since the water problem must be met if the population is to increase, a brief study has been made of various methods of supplementing the water supply.

The agricultural water demands are several times greater than those for domestic and industrial purposes. On the other hand, if we are to maintain industry and an urban population, sufficient water for the purposes of these groups must be forthcoming on a continuous basis. In order to fulfill the deficiency demands produced by a dry year or season, a preliminary investigation has been given to means of producing potable water from the Pacific Ocean. This preliminary investigation indicates that the possibilities of the system should be investigated thoroughly and that consideration should be given to the construction of pilot plants of sufficient capacity to produce reliable data for extrapolation to large units. This brief study does not pretend to be conclusive beyond the point of indicating the possibilities of the various systems for treating sea water and the vital need for intensive research and engineering development in this field. It is hoped that interested organizations may see fit to promote or undertake a program of this type in order to insure the continued growth and prosperity of our Pacific Southwest.

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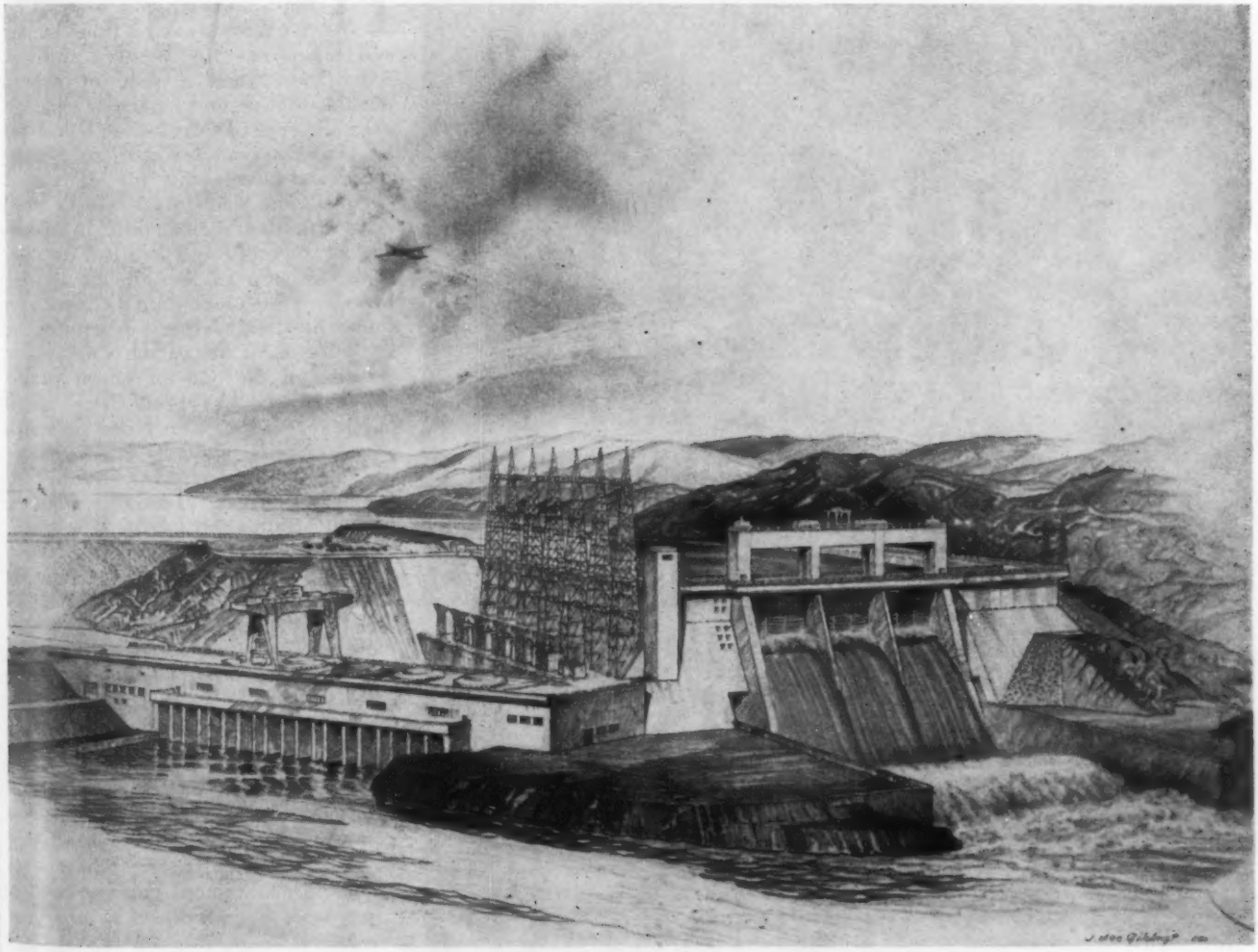
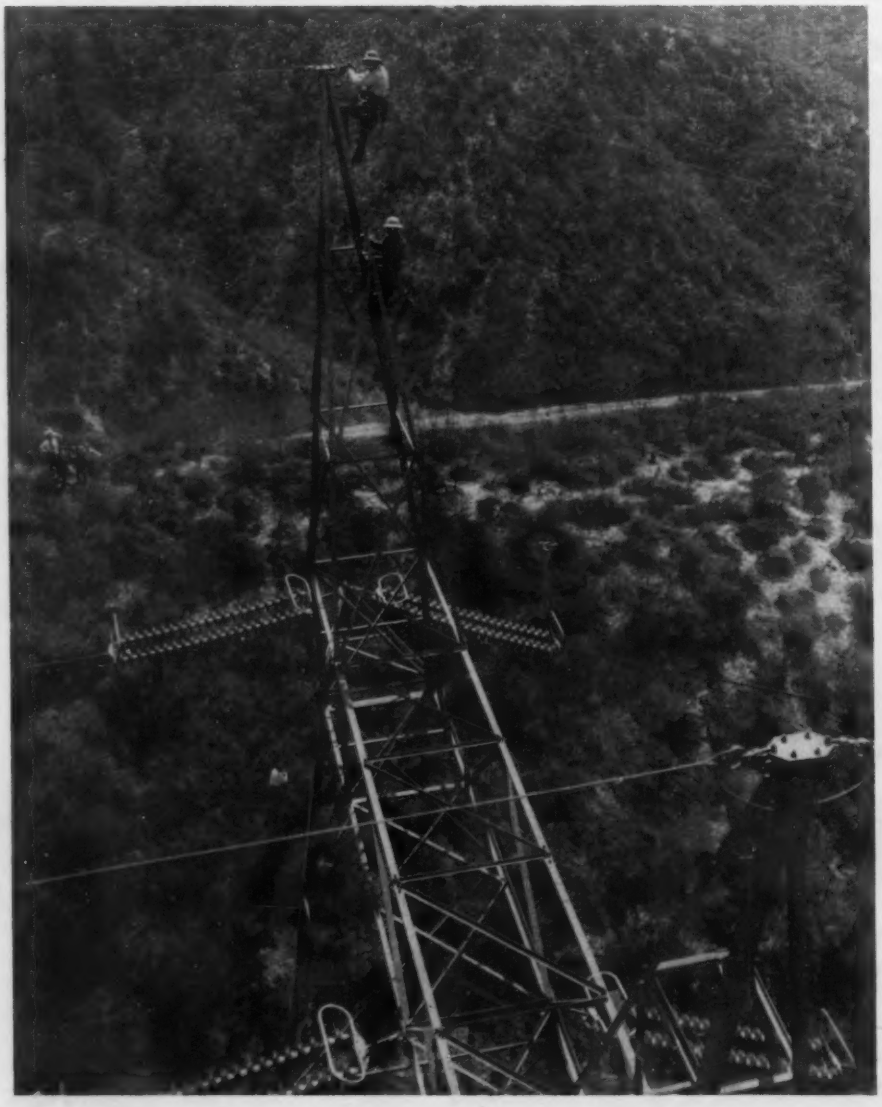


Artist's drawing of Davis Dam and power house, under construction by USBR on the Colorado River, 67 miles below Hoover Dam. Project scheduled for completion in 1949. Drawing by J. MacGilcrist, Denver, USBR engineer

HELICOPTER EARNS ACCEPTANCE

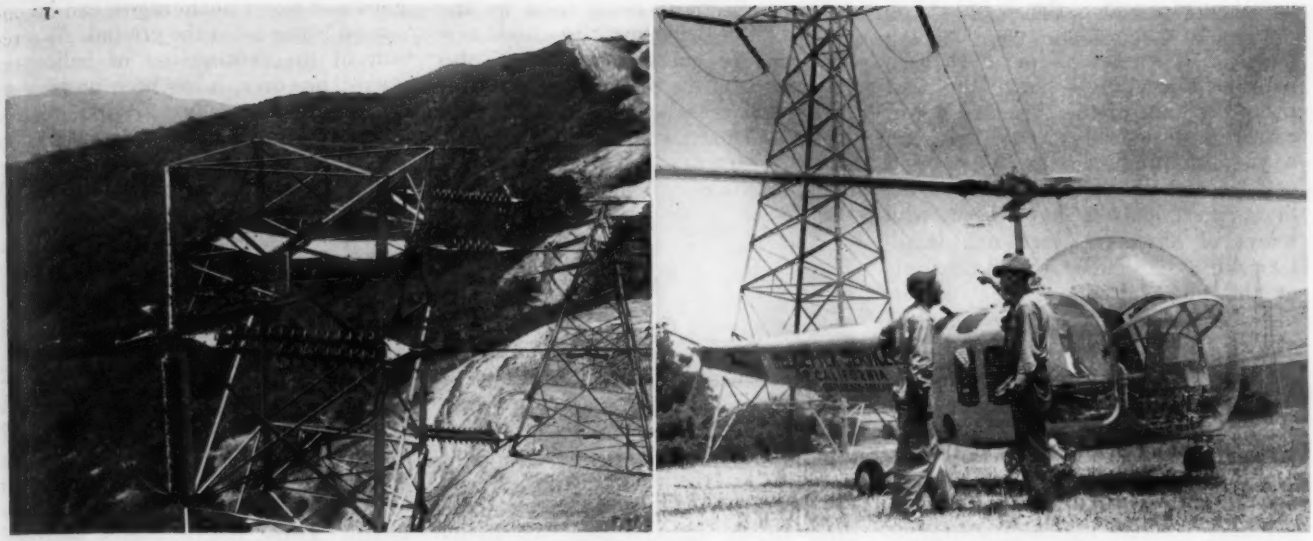


HELICOPTER patrol of the far-flung transmission systems of the West is saving time, money and manpower for Western utilities. After more than a year of experimental, routine and emergency patrols over all types of terrain, the helicopter has clearly demonstrated its safety, speed and adaptability for line patrol.

Outstanding advantage of the craft is its combination of speed independent of terrain, and ability to slow down or stop in the air as desired. Speeds of 30 to 50 m.p.h. have been found most satisfactory depending on the purpose of the patrol. Cursory inspection of the line for major breaks or flashovers has been done at 50 m.p.h. or more. For more thorough patrol, speeds of 30-40 m.p.h. enable the observer to check carefully for minor flashovers, cracked insulators, broken strands, etc. Experience indicates the best position for observation to be about 40 or 50 ft. horizontally from and 10 to 20 ft. vertically above the top conductor. When necessary the craft can hover for close examination of damaged units to determine exact extent of damage and need for immediate replacement.

Top: Helicopter patrol of transmission lines over all kinds of terrain has come through its first year with flying colors. Patrol costs for power lines in rough mountainous country have in some cases been reduced to one-third

Extent of line damage, repairs needed can be easily determined in emergency



Observation from above has the additional advantage of giving a dark background against which the towers and lines are sharply contrasted. This has proven to be much less fatiguing to the observer than looking up against the bright sky.

Time saved compared with ground patrol depends on terrain and condition of patrol roads. Even under conditions which most favor ground patrol the helicopter has operated with comparable costs. Over mountainous areas, swamps or water cost of patrolling has been reduced to as little as one-third.

Two important factors which greatly favor the helicopter are speed in emergencies and saving of manpower. The ability to spot quickly, and carefully investigate line trouble makes it possible to begin repairs much sooner than would otherwise be possible. In one case a serious break on an important line was located from the air at least 24 hours sooner than it would have been located from the ground.

Manpower requirements are reduced almost to nothing by air patrol. A single observer can cover in two or three hours what might require a ground crew two or three days. Experienced linemen who would otherwise be tied up in patrol work are thus freed for construction work, where they are badly needed.

Specific experiences of three Western utilities now having contracts for helicopter patrol in each case indicate continued and increasing use of the service. Experience of these three organizations—Los Angeles Department of Water & Power, Pacific Gas and Electric Co., Southern California Edison Co.—are given below.

Top: Close-up of tower showing how clearly the observer can examine insulators, conductors and structures for damage. Latest model of the Bell two-place helicopter (right) is well adapted and dependable for patrol

Best position for patrol is 40-50 ft. horizontally from, 10-20 ft. above line

Pacific Gas and Electric Co.

Experimental and demonstration flights by Helicopter Services of California began about a year ago. A contract was signed with this organization early in 1948, and first regular

patrol made under the contract on April 24. Since that time approximately 2,400 miles of line have been patrolled, including some of the most rugged terrain of the system. Cost of patrol in practically every case has been substantially less than for ground patrol. Because of the nature of the lines, most patrols have been with relays of observers, each one familiar with a particular section. Reports of the observers have been universally favorable to the new method of patrol.

Observers are given an indoctrination of one or two hours at a speed of 15 to 20 m.p.h. After this indoctrination they are able to patrol effectively up to 35 or 40 m.p.h. On a recent patrol of one part of the system following a severe lightning storm, 28 instances of damage were discovered in 296 miles. Conditions which are ordinarily observed include:

Insulator flashovers
Burns on insulators
Cracked insulators
Rust on tower
Obliterated tower numbers
Trees or limbs too close to the line
Bird nests
Broken or frayed conductor strands
Paint splashed on insulators during tower painting

Only difficulty has been in identifying towers where tower numbers are obliterated or not visible from the air. Usually the lineman can identify the tower with respect to some landmark, such as a road or stream. Another method is to drop a paper bag containing lime, which scatters and identifies the tower for the repair crew. If necessary the helicopter can land near the tower and the lineman climb it for positive identification. Serious consideration is being given to identifying every sixth or eighth tower with a number painted where it will be easily seen from the air.

Operations are at all times at the discretion of the pilot. Helicopter Services has established as limiting operating conditions for their three Bell Helicopters one-half mile visibility, moderate to heavy turbulence and heavy precipitation. Operation is confined to one-half hour before sunrise and one-half hour after sunset. Lines at altitudes of 5,000 ft. have been patrolled without any difficulty.

For patrols which start and end some distance from the operating base in Oakland, or for one-way trips, the helicopter is transported by trailer. The trailer serves as take-off and landing area for the craft—perhaps the smallest airport in the world.

In addition to regular patrols the helicopter is now being used by the construction department to check new lines before energizing. It has also been used by the publicity department on several occasions. Use of the craft by any department is covered by a single contract, which sets up no specific schedule for availability of a ship.

L. A. Dept. of Water & Power

Experimental flights along the lines of the Department of Water & Power were initiated by A-F Helicopters of Los Angeles in August 1947. Under subsequent contracts about 14,000 miles in all have been flown. Present average is about 1,200 miles per month on 115-kv., 138-kv. and the three 287-kv. Boulder lines. All flights begin and end in Los Angeles, eliminating ferry time for one-way trips.

After a year of operation, patrols are now considered routine. The helicopter lands on the roof of the department's garage building in downtown Los Angeles, picks up the observer and starts the patrol from a point nearby. Maximum patrol speed is about 45 m.p.h., flying 30 or 40 ft. to the side and 25 ft. above the tower structures. Maximum altitude on the Boulder line is 4,900 ft. Landings and takeoffs have been made without difficulty at this point under conditions corresponding to an actual altitude of 7,000 or 8,000 ft.

Some experimentation with night patrol has indicated it has possibilities for emergency use. A spot light is mounted on the nose of the craft and swung from side to side as the tower is approached. Flying 50 ft. above the line it is possible to see insulator strings and deflections of wires in the tower structure. Broken conductors, shattered insulators and damaged towers can probably be located at night by this means.

One problem encountered is how to log defects found on the line. If the observer stops to write in a log book he may miss something during the time he is writing. One solution considered is some sound recording device, whereon the observer can record a running log without any lapse of attention. A transmission line carrier telephone receiver is frequently used in the helicopter so instructions from patrol headquarters can be received during patrol operations.

Use of helicopter patrol is limited to fair weather and moderate wind velocities. It has considerable advantage over ground patrol in locating insulators marked by flashovers and in seeing a damage to tower structures and overhead ground wires. It does not supplant ground patrol completely as certain features, such as counterpoise gaps and tower anchorages, can be observed better from the ground. As a result of the routine use of helicopter patrol, however, it has been possible to decrease materially ground patrol crews. Two patrol headquarters on the Hoover lines where buildings were rented and men were on duty at all times have been closed. One or two men now handle all the patrol work on the 1,200 miles per month.

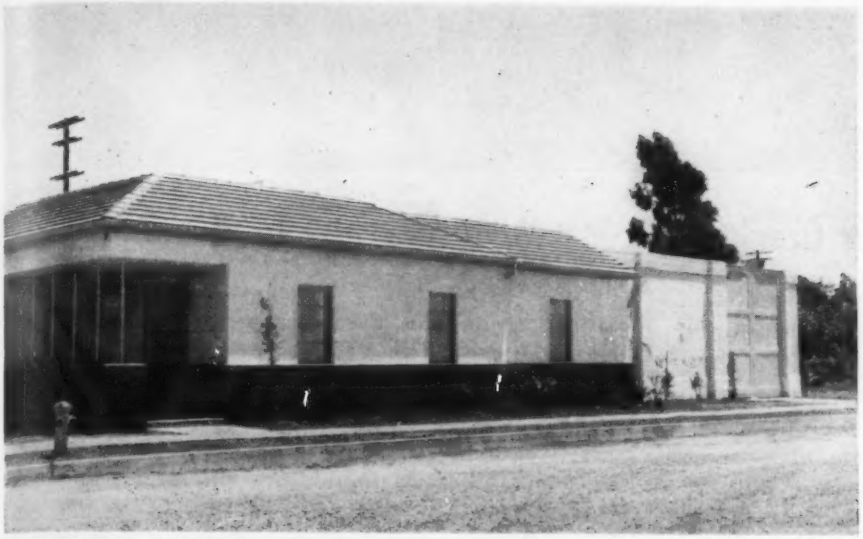
Southern California Edison Co.

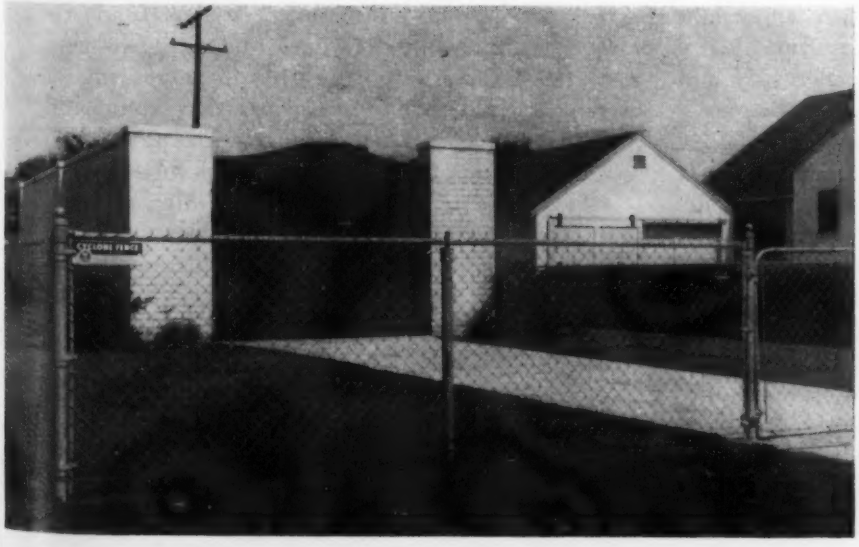
First experimental flights on the Southern California Edison Co. transmission system were made by A-F Helicopters in June of 1947. Helicopter patrol now covers some 1,800 circuit miles (1,250 line miles) per month. Three major routes patrolled are the three 220-kv. lines from the east (Hoover power house), three 220-kv. lines from Big Creek to the north and the 66-kv. lines to Santa Barbara on the west. Each route has been planned to comprise a loop, with a minimum of retracing or deadheading, since it is practical with one patrol to inspect both sides of a tower carrying six conductors in vertical configuration. Speeds of 35 to 85 m.p.h. have been tried, with about 35 m.p.h. proving most satisfactory for twin-circuit lines and up to 50 m.p.h. for single circuits. These speeds allow observers to follow the conductors and observe broken strands and gun shot damage.

The Hoover lines, which traverse miles of desert and are easily accessible by ground patrol for about 80% of their entire length, represent one extreme in type of terrain covered. The Big Creek lines represent the other extreme. They follow a rugged mountain path to elevations of 6,000 ft. with access for ground patrol difficult and time-consuming. Helicopter patrol has been successful in both cases.

First air patrols of the lines picked up numerous items that could be overlooked by ground patrol perhaps for months or years. On the Hoover lines twelve locations were found where ground faults had occurred and been passed by the ground patrols on successive trips. Moderate rusting on ground wire sections was logged on the pioneer Big Creek lines, along with old flashovers and broken strands of aluminum conductor.

Proven utility, safety, speed and economy indicate that helicopter patrol is here to stay. Increased use of the helicopter for a wide variety of other commercial purposes should result in substantial reductions of present rates. As rates decrease, many new applications will undoubtedly become economically feasible.





Unobtrusive Residential Subs

LATEST in Southern California Edison Co.'s evolutionary design for distribution substations for residential districts are the two new types here shown. Upper views are of the same 4-kv. station. Appearance from the street is that of a typical residence of the area.

Substations of this type will have one or two incoming 11-kv. or 16-kv. lines. Capacity of transformers is as required up to 9,000-kva. and provision is made to accommodate six regulated feeder circuits. Equipment is of the conventional outdoor type located within the patio area behind the dummy house.

Incoming circuits and outgoing feeders are all underground; switchboard and battery are located in separate rooms in the building, garage shown in rear of station is used for storing spare parts and garden tools. The surrounding area is appropriately landscaped.

Shown in the lower view is a typical garden-wall type substation for 4-kv. distribution with one to three incoming 11-kv. or 16-kv. lines. Capacity of transformers is as required up to 12,000 kva. Eight 4-kv. regulated feeder circuits can be accommodated with wall dimensions to suit. Equipment within the walled area is of outdoor metal-clad type with all incoming circuits and outgoing feeders underground.

This latter is rather a unique type of substation. It is made to resemble a garden wall with large entrance doors to an area within. Unit substation equipment cannot be seen above the walls and doors, excepting the very top of the transformer from across the street.

Previous designs of residential substations have run the gamut of Spanish architecture but the two new types here shown represent the latest efforts of Edison engineers to provide unobtrusive facilities that will meet with public acceptance in the matter of appearance and yet retain the operating flexibility of the exposed station.

ELECTRICAL WEST

Northwest Has "Power Czar"

ELECTRIC utilities of the Northwest have warned that the region faces a power shortage that may require curtailment of service this coming fall and winter. The Pacific Northwest Utilities Conference Committee, representing both public and private utilities of the states of Oregon and Washington, told the public on Aug. 3, that power demands have grown to the point "where it probably will be necessary to ask all users of electricity to cooperate in conservation measures." *Cooperation* was stressed.

Nowhere has the value of cooperation in planning to meet an emergency power situation been so well demonstrated as here. As a matter of fact, all agencies of the Northwest have become so dependent upon operation of the Northwest Power Pool that cooperation is a physical necessity if effects of a power shortage are to be minimized. Diversity realized through operation of the pool has made 600,000 kw. of additional capacity available out of plant capacity of 4,000,000 kw. as compared with individual capabilities if the ten members of the pool operated separately.

The pool extends beyond state boundaries. It serves all agencies of the region, private utilities, municipals, PUDs and REAs. No regional entity exists with legal authority to enforce uniform curtailment in all areas and upon all classes of customers. Therefore, cooperation is the region's only salvation. No agencies or large industrial power users dare risk break-up of the pool which would certainly result from failure of any important segment to "go along" with whatever the industry as a whole determines is necessary and fairest for all.

The penalty for non-cooperation is obvious to the technical men who operate the pool. If voluntary cooperative action to hold load demands on the pool within its capabilities is blocked by arbitrary attitudes or shortsightedness of those served, it simply means that voltage and frequency will sag. Load curtailment would then be automatic. That is, for a small drop in frequency and voltage. Beyond that, results would be disastrous to much electrical equipment. Load would arbitrarily have to be dropped. If not, stability limits in the highly integrated transmission system of the pool might be exceeded. The pool would drop apart with calamitous results.

Those who might be non-cooperative or arbitrarily decide to stand fast on contractual rights, may well look facts in the face. Under the circumstances, it would seem that a cooperative approach to the Northwest power shortage problem is dictated by technical considerations that have a mandatory tinge. The Pacific Northwest, whether it realizes it or not, has a "power czar" whose rules and regulations are merely the physical laws of electricity. No electrical distributing agencies of the Northwest can exist without the power pool. The power pool cannot exist without the cooperation of each and every one of these agencies and without the cooperation of every single class of customer served.

"They Would Rule the West"

SOME months ago California's Senator Sheridan Downey wrote an illuminating book entitled *They Would Rule the Valley*. It dealt with the machinations of the U. S. Bureau of Reclamation in the Central Valley Project. Obviously Senator Downey had not seen the USBR ten-year power program just released. Had he read the "classified" document—labeled "tentative" by bureau personnel — he might well have changed the title of his book to *They Would Rule the West.*

One can draw no other conclusion after studying the USBR proposal to invest nearly $1,500,000,000 in the production and transmission of electric power in the states west of the Mississippi. Given the necessary funds by Congress, the bureau would quadruple its generating capacity and multiply its power investment tenfold. The ten-year program would add 7,392,600 kw. of new generating capacity and 19,715 miles of new transmission lines to the systems the USBR now operates. Measured by any standards, the bureau would become a real "power octopus" with its tentacles tightly wrapped around the industry and the basic economy of the Far West. It would dominate the production of electric power and thus in reality rule the region.

In studying the program closely one is almost over-awed by the unabashed and presumptuous complete take-over of future power planning for the West. Examples of audacity

EDITORIAL VIEWS

include such items as these: Erection of a 90,000-kw. steam plant at Bakersfield, Calif., as part of the Feather River project in northern California. Building of ten 230-287-kv. lines from the Colorado River to southern California. Labeling the Kings River project as "partially authorized"—an outright misrepresentation. The blanketing of Montana, Idaho, Wyoming, Colorado, Utah and the Dakotas with USBR lines that parallel existing facilities of tax-paying power companies. There are dozens of equally brazen proposals.

Time was when the public became deeply aroused by political interests over "bigness" in the electric power industry. Legislation breaking up the holding companies resulted. The same arguments apply against "bigness" in government power bureaucracies. Given free rein to implement its ten-year program, the USBR could rule the West.

Realistic Rate-Making

RECENTLY we listened to a noted economist hold forth before a small group on the subject of utility regulation. He contended that today's economic trends require a new and dynamic approach to rate-making. Failure to accept this thesis, he said, might impair the financial position of the utilities. Pressed for a definition of dynamic rate-making, he offered three observations on the type of forward-looking theory he envisioned.

First there must be a more equitable sharing of the fruits of the expansion period through which the utilities are now passing. Such growth should provide some assurance that those who finance the development will partake of the profits. Secondly, both commissions and utility management ought to recognize the change in the value of money as something permanent. This would involve abandonment of the idea that values remain static. Finally, a realistic approach to rates requires that they be considered both as an aid to raising capital and to maintaining a reasonable balance in the capital structure.

What this expert means can be summarized briefly and succinctly. Inflationary pressures will force rate increases. Leaders in both the utilities and in regulation must take the initiative soon. He hopes they will be both bold and dynamic in their reasoning.

THE most spectacular thing about the ideas of Carl Marx is the success they enjoy today in spite of the fact that a hundred years have proved that Marx's main assumptions were wrong and those of the capitalist philosophers right. The poverty of the 19th century industrial workers has not spread; the living standards of what he called the exploited classes are higher than ever in history. What has mainly puzzled us in the western world and has made us assist the growth of Communism even as we denounced it, has been our inability to see its pattern. It has taken us a long time to find out that Communist policy will ally itself with any one or anything without the least gesture at consistency if the result is harmful to existing order. The pattern is confusion, chaos and hate, and it is justifiable and systematic so long as it is destructive. Once we perceive that pattern, it is not hard to see how we have fallen into the role of accomplices. Our society is not perfect, but in the last twenty years we have become especially obsessed and preoccupied with the imperfections, and ignored our consistent and considerable progress. The great depression was homegrown, not imported. It was bound to produce strong economic and political reactions, and it did. But the persistence since the end of the war of those reactions has in a large part been due to artificial stimulation. Long ago the abuses that produced them were in a fair way to being corrected and the balance restored. What we have long been in need of is a climate favorable to healing the peaceful arts, but we have not had it. It would perhaps be impossible to prove that the Communists are behind all of our current troubles, and there would not be much value in doing so. But it is not difficult to show that they delight and profit in them, and to the extent that we continue to encourage thought and action calculated to destroy American unity, we are playing directly into their hands . . .—Charles E. Wilson, president, General Electric Co.

Freezer island, sponsored by Southern California Radio & Electric Appliance Assn. at cost of $4,000, was designed to tie in with Department of Water & Power's current $40,000 promotion of home freezers. Continuous demonstrations and a free freezer every night were features

Mayor Fletcher Bowron of Los Angeles congratulates electrical industry following opening of the All-Electrical Exposition by Dr. Millikan, president of Cal-Tech, seated at left on stage. During nine days of the exposition, stage was used for entertainment programs by famous stars

Crowd catcher was any good live demonstration of appliances, like this act at the Packard-Bell Phonocord. Professional whistler, Diana Dixon, records favorite tunes while assistant sales manager, Ken Johnson, center in coat, supervises and Russ Taylor, left, prepares the play back

RUN THEIR OWN

THE Los Angeles appliance industry stood up on its own feet last month, taking the huge Pan-Pacific Auditorium to stage one of the largest electrical shows ever given in the country. This was the first "All-Electrical Exposition" sponsored by the Southern California Radio & Appliance Assn. and produced with the cooperation of the Department of Water & Power, local distributors, manufacturers, individual retailers, radio broadcasters and telecasters, the Army, Navy, Marine Corps and Air Force.

For the first time the electrical industry had the Pan-Pacific for its own—previous electrical shows have been part of the whole building industry's Home Show—and by opening day, Aug. 20, practically every electrical item available to the Los Angeles public was on display in scores of large and elaborate booths. For the first time in its history, the auditorium was air conditioned, adding to

Appliance innards were exposed to view. One peek-a-boo demonstration was this Launderall at Distributor Ray Thomas' booth. Trying it are Mrs. Harris of J. Hokom, Hollywood; Stan Rice of Desmond's, Los Angeles; Newspaperman B. G. Herman; Phil Butler of United Plumbing

Contrasts caught the crowds, made them more appreciative of fine appliances now available. One of several displays of early models of electrical appliances was this showing of old washers. In front of the couple is a 1910 model, owned by D. C. Culbreath. It was still working

Typical of the crowds that gathered for the many television programs which originated from the Pan-Pacific Auditorium during the exposition is this one at Herbert H. Horn's sponsored telecast for the Admiral line. The Horn display took nearly the whole side of the building

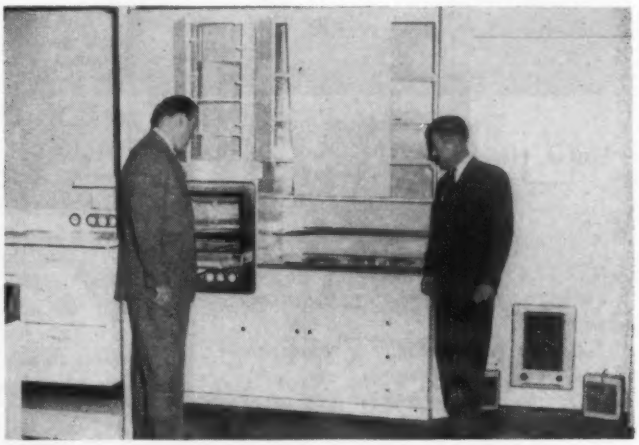
Another mass display, sponsored by the Department of Water & Power, showed all makes of electric water heaters available in Los Angeles area, gave one away every other night. The department has just put pressure on sales of heaters by dealers, jumping its installation allowance

BIG EXPOSITION

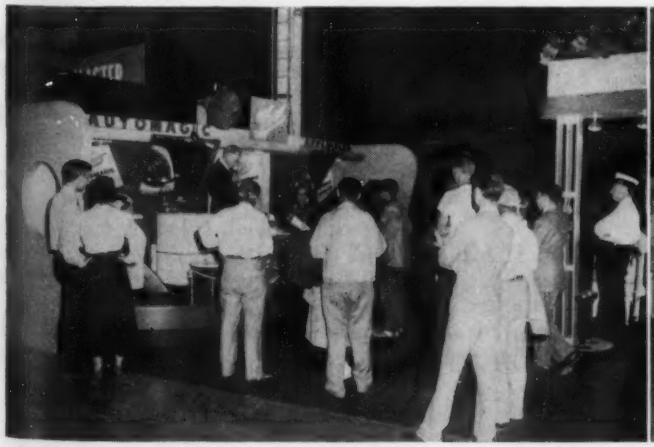
the comfort of the thousands who came out to see the latest in electrical goods for the home, to get a chance at the many prizes, to watch the variety of entertainment, including live television and radio broadcasts, and to see the electrical wonders demonstrated by the armed forces.

Like any successful presentation to the public, the Los Angeles All-Electrical Exposition succeeded because of a long period of hard work and thorough organization by a large number of people. Spearheading the work on this show were William J. "Bill" Quinn, managing director of the dealers' association; Howard Burdick, secretary of the association and supervisor of dealer relations for the cooperating Department of Water & Power; Paul Buehler of the Leo J. Meyberg Co., representing the appliance distributors; Willard F. Hellman, representing the retailers.

By the time the exposition was ready for an official opening and review by the press and local dignitaries,



Big men for a kitchenette but Frank Ballman, left, sales manager of Thermador, and Dick Paige of Thermador were mighty pleased with the presentation of their new apartment-size built-in electric range. Cabinets over and under, revolving shelves in corner were features of display



Always successful, a live talk and a good demonstration. Among several that stopped the passing crowds was this demonstration of the Thor Gladiron with a microphone-assisted step-by-step description from the salesman. Clothes and dish washers, and disposers, also were in action

Nine dealers took space for their own displays, others took turns in many displays of their distributors. Side-by-side were two of largest dealer booths, Montgomery-Hellman, left, and Price Brothers, right. Both featured kitchen and laundry equipment; drew many live prospects

more than 175,000 part-paid tickets had been distributed to dealers through the dealer relation men of the department and another 300,000 part-paid tickets went into the hands of dealers through the local appliance wholesaling organizations. Broadcasters had cooperated with many spot announcements and telecasters were ready to start originating many shows from the exposition stage. More than 1,000 bumper strips had been put on the cars and trucks of appliance dealers. The business and industry members of the Los Angeles Advertising Club had watched Hollywood artists and producers select "Miss High Voltage" from a group of girls representing Los Angeles communities, and Paul Buehler had crowned her in front of the flashbulbs of the metropolitan press.

Los Angeles' first All-Electrical Exposition was still going on at press time, but early indications were that it was the first—of many such shows in that city.

"He'sa costa too much!"
Ernest Hatch Loris Winn

SALESMANSHIP a la 1948

Customers, not salesmen, make the sale when it comes to commercial cooking equipment these strange days

Carl Hoffman *
Washington Water Power Co.

Scene 1—1940

Locale—Joe Hesperedes' Hamburger Emporium.

Joe, the proprietor, in rolled shirt sleeves and soiled apron and cook's cap, is very busy frying hamburgers on an oil griddle. The place is greasy and smelly, and that goes for Joe, too.

Salesman, Freddy Watts, enters briskly, sales folder in hand.

Freddy—Good morning, Joe! A grand day, yes sir, a great day for you to order that new electric griddle and fry kettle.

Joe—He'sa costa too much.

Freddy—Why Joe, with an electric griddle you get heat control. Just set the dial and it gives you perfect heat for whatever you are frying. And that fry kettle, why with grease at 15c a pound, you save enough grease to pay for the electricity you use.

Joe—Thatsa trobla, electric he's a costa too much.

Freddie—With our 1½c rate it will cost you only 6c an hour and—

Joe — (*interrupting*) How mucha month?

Freddy — Well, you are open 18 hours a day, so that will cost you about $30 to $35 a month.

Joe—(*throwing up his hands*) Sonova Beeskit, two time as mucha oil! You get outa here!

Needless to say our hero didn't make the sale. Now turn to

Scene 2—1948

Locale — The office of the utility company.

Salesman Freddy, sits at desk, feet on top, reading the paper. Joe Hesperedes enters, nattily dressed, bow tie, fresh cigar in mouth. Stands and waits for recognition. After waiting for Freddy to come to life he addresses him.

Joe—Hello, Meesta Watts.

Freddy—(*looks up and surveys intruder first*) Why by gosh, if it isn't Joe Hesperedes! What have you done to yourself?

Joe—(*with dignity*) Oh I maka mucha money. I came to see you because I remodeling my restaurant. I gonna spend $50,000, fixem up nice. I wanta complete electric cooking and water heater.

Freddy—Good heavens, haven't you heard there is a power shortage?

Joe—You solda me long time ago. I wanta electric cooking and now I going to have it.

Freddy—Yeah, but at ½ cents a kilowatt hour it will cost you a lot of money and, say, did I hear you say you wanted to heat water electrically?

Joe—Sure. Supply house tella me tree 100-gal. tank wid de superheaters on dishawash giva gooda service, huh?

Freddy—Gosh. How many ranges will you need?

Joe—Tree ranges, tree fry kettle, anda bakery oven.

Freddy—Let's see now. I am not much up-to-date any more on this electric cooking, but that's about 100 kw. and 18 kw. for water heaters and did you know you'll have to take the off-peak rate for your water heaters so that will shut them off between 4 and 8 p. m. every day?

Joe—I no wanta water heaters that hava to be shut off. I wanta hot water alla time.

Freddy—Cost you 1½c a kilowatt hour then.

Joe—you fixem up so I gat de power?

Freddy—Well, I don't know. We are short of transformers and the power supply department isn't going to like this.

Joe—Looka here, Meesta Watts. I ordered my new ranges and I wanta de power.

Freddy—Well, it may be 90 days.

Joe—Hokay, but be sure it no take longer because I be alla ready to open by August firs'.

Needless to say, Joe got his power, but aren't we in a helluva predicament?

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* Presented at Commercial Cooking & Heating Committee meeting of Northwest Electric Light & Power Assn., at Victoria by Loris A. Winn of Pullman as Joe, and Ernest W. Hatch of Spokane as Freddie, both of Washington Water Power Co.

ELECTRICAL WEST Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

September 1948

The new "regulation W" goes on Sept. 20, but it is tame compared to the original. Stoves, dishwashers, ironers, refrigerators less than 12 cu. ft., washers or combinations of them, room unit air conditioners, radio and television and combinations, sewing machines and cleaners, costing from $50 to $5,000 will take a 20% down payment, 15 months for the balance of $1,000 or less, 18 months over that. If you extend credit you must file registration with the nearest Federal Reserve Bank within 60 days, keep records of installment sales. You are automatically licensed. Violations may bring license withdrawal, court proceedings both criminal and civil, and might declare unenforceable any sales contract.

Out goes "no money down"

A gentleman's agreement between Senator Homer Capehart and FTC may hold back any price policy charges until the Senator's committee finishes an inquiry into the basing point policy and its effect on the economy. He has invited 40 business leaders as an advisory committee to bring in the views of business and industry. Next congress will then be asked to act and clarify the laws.

Truce

Bendix Home Appliances, after its dealer uproar on the price drop, has put in a new price protection policy on its full line. A six months' price guarantee expires Jan. 31, 1949. Herb Names of Denver, NERA president, congratulated Parker Ericksen, Bendix sales director, for it.

Protection

Kelvinator has put a ten-year warranty plan on its water heaters equipped with the magnesium alloy anti-corrosion rod. It means immediate replacement the first year, if defective, after that installation and transportation charges to five years, after that a sliding scale on replacement price.

Long life

Ray Cosgrove, executive vice-president of Avco and head of its Crosley division, hit Los Angeles and San Francisco for meetings with J. N. Ceazan Co. and California Electric Supply. Asked Crosley dealers if they were prepared for selling when refrigerators come into full supply--prepared with well trained sales people ready for specialty selling. Said, "Don't pass up the freezer business!" Told dealers Crosley wasn't shipping in any television sets where there was no videocasting; it only made the public wait. Radio sales keep up even after video comes, he said.

"From the horse's mouth"

Another Ray, Ray Hurley, chairman of the board of Thor and of Thor tool company, a separate outfit, came West and met Thor people and dealers in Seattle, Portland, San Francisco and Los Angeles. Asked about the Lustron steel house he said tooling is not yet finished. Steel houses for quantity tracts should roll in their own trailer and truck loads by early in the new year. — Steel houses

With three products to concentrate on Hurley told what big promotions are forthcoming on Thor washers, ironers and dishwashers. He advocated sales aggressiveness, specialized effort on the three appliances, live demonstrations and indoctrination of sales people. The sales features, though "obvious as hell" would bear repitition. The public, said he, is just waking up to the dishwasher. "They are finding out the dishwasher doesn't put the germs back on the dishes with a dishcloth." Temperature of water and detergent are sanitary features. — Straight talk

Cory Corp. has been through one of the bitterest jurisdictional labor disputes in the business but NLRB certified IBEW local 1031 as the official bargaining agent for its employees after employees defeated the CIO United Electrical Workers, which Cory counsel called "the outstanding example of a communist dominated union." — Fight over

Speaking of unions, the arbitrators award to the Oakland electrical workers of $2.50 an hour, higher than any on the Coast, immediately set in motion a wave of demands for the same scale. What it means is higher installation costs still again beginning December and January, for plumbers scales go to $2.50 an hour then too. — Another round

Association of Appliance Dealers of Seattle is negotiating new wages for radio service men with Local 46, IBEW, Seattle. Union wants to raise shop manager from $1.80 to $2.00 an hour, technicians from $1.65 to $1.90, and television technicians, not included before, $3.50 an hour. — New scale

Cutler-Hammer, old timer in switchgear, etc., will have an electric range element with some corrugations and other features. Will be called Pyroflex and be for replacment or to equip new ranges. — "Burner"

Gordon E. Wilkins has given up all Ironrite factory activities but keeps distributorship of Ironrite for California, Utah and Arizona. Makes headquarters at 121 So. Alameda, Los Angeles; a display at 1163 Broadway where demonstration schools are held. Oakland headquarters still remain at 3100 Telegraph and demonstration and display room at Western Merchandise Mart, San Francisco. Also has California distribution for Haag washer and Anderson gas range. — Simplifies

James C. Pollard, president of the Jud Whitehead Heater Co., says the indictment of J. J. Whitehead, former president, and Louis Obler, former vice-president, does not affect the firm's operations. The company has been operating under a creditors committee since February, Pollard says. — Still running

Admiral will soon have a two-speed record player for long-playing records which will go into all console models above $169.95. — Double

Pilot Radio Corp. has appointed Cooper Sales Associates, under S. J. Cooper, 959 N. La Cienega Blvd., Los Angeles, as southern California representatives. — Change

As if 33⅓-rpm. long-playing wasn't bad enough for dealer inventories, Tide magazine says RCA may bring out a 45-rpm. machine and records. The Tower of Babel of record business may well fall from such complicating breaks from standaridization. Already radio-combination sales are suffering from the public's "waiting to see." Once upon a time the battle between vertical and horizontal grooves put the record business in the dumps. It's time for a standardization conference. — Trouble?

There are also a rash of bright ideas like "Record of the Month Club" and "Records by Wire" borrowing the florists idea, springing up. The latter would be an association of record dealers who would deliver records by telegraphic request. The former would be a direct sales to consumer deal. — Groove ideas

Electric clocks, which had such a setback when power shortages upset frequencies and slowed them down, will get a big promotion this fall, says Joe Burns, Telechron man for the West. Big color spreads in the national magazines will blaze the way for restored sales. Interesting note--in making its frequency change from 50 to 60 cycles, So. Calif. Edison found 300,000 clocks to exchange or change over, or a ratio of only one clock to each two homes. That still leaves a huge market for electric clocks when every home can use five or more easily. — About time

That live bunch, the Inland Empire Electrical Dealers Assn. has its Spokane Consumer Bureau at work making experiments on the foods that can be frozen successfully. In October there will be a public meeting on the use of freezers and methods of preparing foods. A member of the consumer bureau will make the experiments in her own home, report on results to 2,500 club women groups. Freezer Week has been set as Sept. 27 to Oct. 2. — Ladies Aid

Fall advertising campaign on the Simmons electronic blanket will be directed toward promoting it as a medically-sound defense against colds. Copy will break in leading magazines in September. — Simmons says

NEWA is putting out a quarterly Future Trend Survey covering estimated future appliance sales in percentages, compiled from membership questionnaire returns, says Charles G. Pyle, managing director. — Quarterly estimate

Jackson Distributing Co., Salt Lake City, held open house at its modern new quarters located at 115 Southwest Temple St., following a private dealer showing of the 1949 Capehart-Farnsworth line, which attracted more than 125 dealers from Utah, Idaho, Nevada, Wyoming and Oregon. — All new

Raymond C. Babcock has been appointed manager of appliance promotion for Graybar Electric Co.'s Northwestern District, including Seattle, Portland, Tacoma, Spokane and Butte. He has been with Graybar for five years as assistant advertising and sales promotion manager at the company's national headquarters in New York. — Appointed

Hamilton-Beach is on the market again with a new mixer. Improved feature is the "mixguide," an indicator at the front of the mixer with ten different speeds, easily visible, and for one-hand operation. Another feature--"Bowl control" which can be achieved by a lever at the bottom of the standard which shifts bowl while beaters are in operation. — Easy to see

Voss Bros. Mfg. Co., Davenport, Iowa, makers of household washers, has gone into full production of a double-wall corrugated tub, according to Edward F. Voss, vice-president in charge of sales. — New tub

The feature-freezer just announced by Frigidaire is a mobile six-cubic-foot model, mounted on wheels and equipped with a merchandising panel. Cabinet holds about 215 pounds of frozen food or ice cream products. Can be moved easily about store area or pushed outside for display. By adding a slip-over the freezer can be converted into a frozen food merchandiser.

Freezer on wheels

Sunset Electric Co., Seattle, distributors of Emerson radio and television products in Seattle, with outlets in Spokane and Portland, held nine dealer showings in various cities in Washington during the month of August, and in Portland the early part of September, showing the 1949 Emerson radio and television line.

Dealer showings

Westinghouse Electric Supply Co., Seattle, played host to more than 300 Westinghouse dealers at a dinner meeting recently which featured the showing of new Westinghouse laundry equipment. L. D. Pulsifer, district appliance manager, was in charge.

Laundry line on display

Hotpoint is putting out a new 40-gallon table top electric water heater. Measures 24 inches wide, 25 1/8 inches deep and 36 inches high; provides 10 gallons of additional capacity; occupies no more space than the Hotpoint 30-gallon model.

40-gallon model

Horton Mfg. Co. has a special tie-in offer on its portable ironer and a table--to sell at $54.95. Will follow through with merchandising helps from the manufacturer to the dealer.

Ironer duo

Cory has a new merchandising package designed to promote its new electric knife sharpener. Self-demonstrating counter display unit contains one knife-sharpener, a knife chained to the display, and a dulling block. Copy on display invites shoppers to try the product.

Sharp

Webster-Chicago Corp. is offering its dealers an "electronic memory" department to display the company's wire recorders, record players and amplifiers. The counter weighs 70 pounds and has shelves at three levels. Outlets are provided for interconnection of units.

W/C displayer

Lytron Merchandiser is the new three-dimensional display that Lightolier Inc. has put out for its dealers. The display is complete with eight fluorescent fixtures, each individually controlled.

"Lytron"

Emerson distributors were notified that effective September 1 prices would be raised from 6% to about 15% on current 1949 Emerson radio and television receivers.

Boost

Field Sales Co., Portland, Ore., recently appointed distributor for Apex Rotarex Corp., is located in a new building which houses general offices, modern sales room, service department and warehousing space. The firm serves Oregon and lower Washington.

New line

Aimiral's fall and winter sales promotion was explained to Admiral regional sales managers recently at a meeting in Chicago. Emphasis will be on Admiral's video sets. Westerners Hal D. Conklin, San Francisco regional manager, and Lou M. Willis, Los Angeles regional manager, attended the meeting.

Stress on tele

Tommy Thompson's, Denver, has been named a distributor for the Hoffman Radio Corp. in the territory of Colorado, Wyoming and parts of Kansas and Nebraska.

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S. F. Mayor Robinson Charles Dostal Frank Folsom

MARKET WAS EAGER

"MANY people in this audience have never had the experience of selling in a free economy," Harold E. Jalass, vice-president and general sales manager, Cribben & Sexton Co., Chicago, told the crowd that packed the big auditorium of Western Merchandise Mart for the Western radio and appliance trade dinner, Aug. 4. He had told how two factors, steel and the foreign aid program, will bring higher prices and higher taxes. Against these it would be necessary to sell far more effectively than in the past.

Jalass paced the stage above the head table, humorously acting out his advice to salesmen. He told them they must believe in their company. "How do you expect to sell if you are a hypocrite?" Know how the product is made and what it will do; learn to cook on a cooking appliance," he advocated. "You gotta love it, you gotta enjoy it. You can walk up to your product with confidence, then you can *sell* it."

As to price, Jalass said it is necessary now to readjust ideas to a 50-cent dollar. Salesmen must get prospects to think in terms of value. Price and value are not the same. It is up to the salesmen, he concluded, to sell in the face of higher prices in order to keep factories running in the face of material shortages, labor shortages, shorter terms, high material prices and difficult times.

As chairman of the meeting, Charles A. Dostal, Westinghouse Electric Corp. Western vice-president, contrasted this market with that six years before at the start of war. This market, he said, had been the biggest yet, with dealers eager for merchandise.

"Never did so many people fight so hard to lose so much money," Frank Folsom, executive vice-president of RCA, Camden, and onetime department store executive in San Francisco, quoted someone as saying of television. But Folsom himself was very optimistic as to the future of television.

Videocasting will arrive in San Francisco this fall, he said; three stations already are under construction. He reviewed the situation in the San Francisco Bay region, which will have six channels; predicted network operation by 1952 with regional links much sooner. Likewise he told of many uses of television outside the entertainment fields, such as in teaching, televising operations to medical students, religion and politics.

In San Francisco the industry will learn how television operates in a mountainous region, something not yet known. The city will profit from two years of experience in other cities, where there are now 31 operating stations and by the end of the year there will be 50. He predicted the San Francisco market total retail volume in 1949 could be ten million dollars.

Dostal concluded by calling the next ten years the television decade, predicting over twelve million sets by 1952.

The dinner and entertainment, arranged under the direction of George L'Amoreaux, Mart promotion manager, climaxed the rush of dealers from all over the West to place orders ahead of anticipated price rises. There weren't so many lookers, but those who attended meant business. The toy and giftware and houseware market in the city at the same time showed some livelier buying than the last two markets also.

On the next page are some of the displays on the two complete appliance floors.

A few of many displays on the appliance floors of Western Merchandise Mart during Market Week, across the top and around the page in sequence:

Mr. and Mrs. Dave Rose, Chicago Furniture Co., Fresno, inspect louverall ceiling in G-E kitchen. New "push button" range is displayed at right

Hoffman, made in Los Angeles, shows a matched blonde-wood television receiver to go with its radio combination. Mr. and Mrs. Ted Matson of Knight Furniture Co., Willits, are shown it by G. E. Moxon, salesman for the Hoffman branch

Jewelry elegance is the atmosphere in the newly opened Manning Bowman display room, where George H. Watson also makes his office. Paneling, shadow boxes and matching fixtures are in lime oak on black walnut with crystal shelves, illuminated

Westinghouse had a live ventriloquist show by Roy Douglas and dummy Eddie Westin. Lois Ferris, home economist, explained appliances on the stage

Opening a showroom in San Francisco, Sues, Young & Brown showed the Coolerator line. At side of "Pete" Sues is Joe Zavosky; across from them are Brick Tyson, Charles Barr and H. R. Andrews

L. J. Meyberg Co. had a live television show, telecast in the room and visible on sets all about

ELECTRICAL WEST

Sales Guide

FOR THE ELECTRICAL MERCHANT OF THE WEST © SEPTEMBER, 1948

The Ironer is Here to Pay

MANY dealers have discovered the ironer. To their surprise it sells. What's more it is a profitable sale. Others wonder how they do it, having found them slow to move in the past.

Like anything else it takes know-how to sell. But that is not hard to acquire. Just a bit of thought, some practice and you will find that women are far more receptive to the idea of having an ironer than before the war.

For one thing more laundering is done at home. Prices at commercial laundries have been rising with labor rates. Women to come in and do the washing just aren't to be had. Another thing—people who take the washing to a coin-operated laundry still have ironing to do.

One important thing is to operate an ironer enough to be able to show a prospect how to get started. Then it is a good idea to get her to sit down and try it.

Now every make of ironer has certain sales points or gadgets. But don't forget the fundamentals—the **real** reasons why women buy one. To put these in **her own words,** just as **you** should do, here they are:

Sit down comfortably to iron. No tiresome standing for hours. Some women become so expert they can read while ironing.

Save your strength. No iron to lift and push.

Keep cool, because heat rises away from the face across the ironer.

Save money in laundry bills, and in investment in extra clothes to send out. Do **home pressing** too. **Less wear and tear on** clothes. Presses suits, pleated skirts, shapes sweaters, knitted wear, velvets, etc., in a professional way. Shrinks yardage before dressmaking. Kills moth larvae by running woolens through heat.

You are always presentable and comfortable in case someone drops in unexpectedly. Don't look hot and bedraggled.

Linens look crisp and glossy. Curtains hang straight. Less starch needed.

To Be Financially Successful

Let the Other Fellow Worry

Ken Hampton

RECENTLY several retail dealers have been in contact with our firm to discuss the competition of other retailers selling in the same market that they do.

In most of the cases they were concerned either about another electrical appliance store opening near them or about reports on price cutting or excessive trade-ins. Always they expressed fear of competition.

There is a definite distinction between the **fulfilling of a needed merchandising function** in a shopping community and **competition.**

A retail establishment must meet and satisfy a definite need for its services to exist at all. Its profitableness, in the last analysis, is dependent almost entirely upon how well it meets the need for its services.

Large merchandising units, such as department stores, tend to develop in close proximity to each other. Many of them have customers who never even go into other similar stores although they are just a few doors away. All of them fulfill a definite need for their services. Each enters into competition with the other to give the customer the best product to meet his needs.

It is well for retailers of electrical appliances, especially those managing newly established businesses, to know this and reexamine the need for their own services.

As a means of doing this we suggest that the following points be reviewed:

1. **Is the sales volume of your store increasing?**
2. **Are more people coming to the store to buy?**
3. **Do former customers return?**
4. **Is the merchandise being offered of good quality; fairly priced?**
5. **Are the customers paying their bills promptly and without complaining?**
6. **Are repairs and adjustments being made promptly and fairly?**
7. **Are the wholesalemen calling on you satisfied with the progress being made by your store?**
8. **Is the store handling or getting for its customers the merchandise there is repeated call for e.g. — fuses, light globes, etc., as well as that which the store wants to sell?**
9. **Is the store housekeeping, display, standard of politeness, appearance and method of pricing, terms, etc., such that they please the customers who form the immediate trading area?**
10. **Are you more than satisfying the distribution needs in the retail area you cover so the manufacturers you represent will not need to look for more outlets to get their full share of the market?**

If you can honestly rate your store "good" on these ten points then let the other fellow worry about you. It is no accident that makes one store succeed and another fail to grow. It is rather a constant attending to the details that give customers better, friendlier service.

APPLIANCE PREVIEW

Push-Button Range (928)

Push-button control and use of colors to identify heat positions are features of the 1949 Hotpoint range.

The push-button control panel is located on a high backsplasher with lighted buttons fully visible above utensils on the range surface.

The backsplasher may be tilted forward for servicing of controls and in this position power is cut off automatically. The oven and surface units can be serviced from the front of the range.

The entire cooking surface is lighted by a 36-in. F lamp in the backsplasher. Other conveniences are a raisable thrift cooker unit, removable drip trays under the Calrod surface units, more storage space, a new timer clock.

There are four sets of push buttons—one for each of the four heating units on the top of the range—and there are five buttons to a set, controlling five cooking heats. The first button of a set turns on the red light, indicating operation at top heat on 230 volts. The four other buttons control successively lower cooking heats and work in conjunction with yellow, violet, green and blue lights.

Floor-Type Fan (929)

Baldor Electric Co. has added a 24-in. floor-type air circulator to its line. Feature of this unit, according to the manufacturer, is use of a relay-type capacitor start motor which has no centrifugal switch. This device has a chromium-plated column, tiltable fan and switch in cord.

Thermostat (930)

A clamp-on type thermostat for electric water heaters has been designed by Cutler-Hammer. Utilization of bellows-to-tank contact is said to eliminate need for an immersion well to house the thermostat. A bracket mounted on the side of the tank permits the small-size thermostat to be snapped into place quickly. Mounted, the unit extends only two inches off the wall of the tank.

Air Conditioner (931)

A window-type room air conditioner, equipped with two separate refrigerating systems for selective cooling of home or office, has been developed by Frigidaire. A smaller unit of similar design has a single refrigerating system.

Operated by two hermetically sealed self-oiling Meter-Miser compressors, the dual refrigerating systems provide more than three-fourths of a ton refrigerating capacity. They may be operated together or separately; one supplies capacity to cool a room during the night and temperate summer weather, both systems are operated simultaneously during extremely hot days.

The unit is 28¾ in. wide, 32⅛ in. deep, 14¼ in. high, will air condition rooms up to 500 sq. ft.; filters, dehumidifies, cools and circulates air at the rate of 325 cu. ft. per minute. Fresh outside air for ventilation may be added at a rate of up to 50 cu. ft. per minute.

Kitchen Clock (932)

The Harley kitchen-pan clock has the Hansen synchron electric clock movement; is offered in stainless steel or copper; numerals in blue, black, red, yellow or green; 15 in. over-all, with 8-in. dial.

Water Heaters (933)

A new series of electric water heaters equipped with magnesium rods to protect tanks from corrosion and backed by a 10-year replacement plan in event of tank failure is offered by Frigidaire. All models in this EKM series have either one or two Radiantube heating units, similar to those used on Frigidaire ranges, the announcement states.

Telephone Device (934)

The new Tel-O-Aid, manufactured by Wagner-Metcalf Corp., Glendale, Calif., eliminates lifting the telephone receiver for conversations. Attached to a light outlet, the machine can be used for interoffice communications, or detached for private conversations. Both incoming and outgoing voice is audible in normal tones from any point in the room.

Filter for Dryer (935)

An air filter said to end the lint problem is now optional equipment on the Bendix automatic clothes dryer. This filter consists of a bakelite container, a screen fitting over it and a hook for fastening to the dryer. Water is used as the filtering agent.

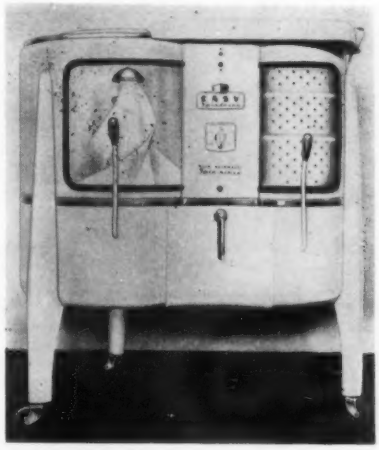
Floor Conditioner (936)

The Kent floor conditioner is claimed to provide complete floor conditioning. It has two concentric brushes operating in opposite direction for balanced operation. The machine gives 2/3 lb. per sq. in. pressure on the brushes. Motor is forced draft cooled ¼-hp. capacitor-start motor, ball bearing type.

Range Heating Unit - (937)

Pyroflex is the trade name of a new surface heating unit for electric ranges introduced by Cutler-Hammer Inc. This unit provides two-way heat on intermediate heats. A stainless steel mounting ring is beveled to eliminate hard-to-clean corners.

Spin Rinse (938)



Easy's Spindrier features a new automatic spin- rinse, which works on the flush rinse principle. The operator turns a tap, pushes a lever to start the basket and a whirling spray comes up through a hollow cone in the spinner basket, through more than 1,500 holes. A double-action rinse is produced—a needle-spray and a whirling force. Hot water is used for a period of 30 seconds, then the rinse is finished with cold water for about 2½ minutes. This rinsing method is said to use less than 3 gal. of hot water.

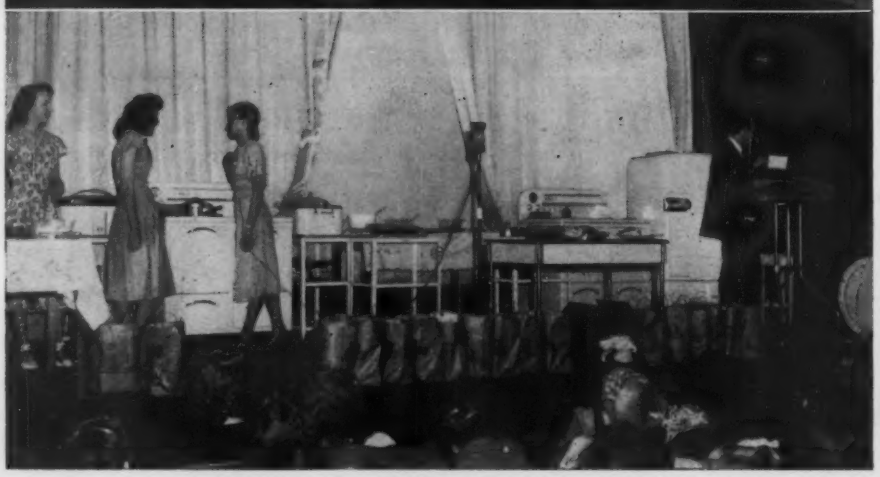
ELECTRICAL WEST, 68 Post St., San Francisco 4, California
Please send me information about following CIRCLED items:

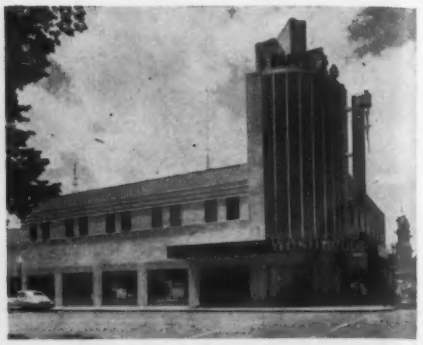
928 929 930 931 932 933 934 935 936 937 938

Name ..... Company* ..... Title* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.





Reno Style

Something doing all the time keeps Reno the live town that it is, and to sell to that town takes the same spirit. So Joseph Moore and Milo Tally who recently took over the big retail store that used to be Savier's, at Second and West streets, keep things stirred up with a grand opening, as seen in the top picture or cooking schools as in the bottom photo, or a freezer promotion now going on.

Milo Tally used to be a Westinghouse appliance promotion man and he is putting to practice what he used to preach to dealers. His partner was a salesman at Savier's, which has now become totally a wholesale firm and has moved a distance away. Tally is seen below, right, presenting a radio to one of the prize winners at the grand opening, a three-day affair last April. All Moore-Tally equipment is brightly identified with blue and orange. It advertises. Radio programs and announcements, big newspaper space and promotions and school in local theaters (filling them to capacity) advertise store. Store has a special listening room for high-class sets upstairs; a basement filled with kitchen wares.

AUSTIN FOR LIGHTING NEEDS

The Austin Line provides material for installation of all types of lighting equipment, from high line to the last outlet. Also included are Yard Lights, Remotrol Remote Control Switch, Weather Tight Outdoor Lighting Fixtures, and a complete line of fixture fittings.

WEATHERPROOF Yard Lights

New Austin WPL-114 fixture made of rustless aluminum, with ½" conduit threaded hub in back and bottom. 14" reflector.

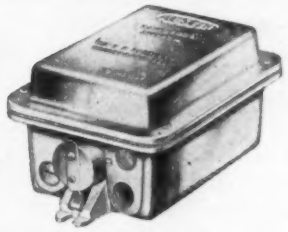
No. SPB-12 fixture for exterior wiring, straight bracket with pole or wall mounting bracket. 12" reflector.*

No. SWB-12 fixture for connection to inside wiring system. Straight bracket with adjustable mounting flange. 12" reflector.*

* SPB-14 and SWB-14 have 14" reflectors.

REMOTROL

REMOTE CONTROL SWITCH



Controls yard lights from as many different switch stations as required.

WEATHER TIGHT Outdoor Lighting Fixtures

No. REA-1 Pendant type, complete with globe —no guard.

No. REA-2 for 4" square, or 3¼" and 4" octagon outlet boxes with globe—no guard.

No. REA-3, 100-watt guard for use with Nos. REA-1 and REA-2 fixtures.

No. GC-100, 100 watt globe for use with Nos. REA-1 and REA-2 fixtures.

Write for complete information and prices

FIXTURE FITTINGS

Studs, Extension Pieces, Nuts and Straps

WE SELL EXCLUSIVELY THROUGH WHOLESALERS

The M. B. Austin Company

NORTHBROOK, ILLINOIS

Electrical Committee Reorganization

As three of the sections of the International Association of Electrical Inspectors meet in annual meeting in the West this year in September, they will learn of the new reorganization of the Electrical Committee of the National Fire Protection Assn., which was predicted last year. In reorganizing it, the National Fire Protection Assn. has formed a new electrical section.

Instead of the Electrical Committee of 50 members and 50 alternates chosen to represent the various interests involved in the electrical and insurance industries, the new electrical section will likewise be made up of similar representatives but they will not be called together annually for code revision. Instead the actual code-making functions are to be performed through a series of panels but under the general direction of an electrical correlating committee. This committee was selected on a personal basis rather than as representatives of organizations. The experience of the men in code work was the primary factor in their selection.

On this correlating committee Alvah Small, president of Underwriters' Laboratories, remains as chairman and the new field engineer, Charles L. Smith, is the secretary.

Members of the committee include George Andrae, electrical contractor, Milwaukee; E. A. Brand, Niagara Electric Corp., Buffalo; M. M. Brandon, Underwriters' Laboratories, New York; L. W. Going, electrical inspector, Portland, Ore.; Richard L. Lloyd, National Bureau of Standards, Washington; James W. Lynett, New York Board of Fire Underwriters; August H. Schirmer, Bell Telephone Laboratories; George L. Swan, National Board of Fire Underwriters; Frank Thornton Jr., Westinghouse Electric Corp.; E. E. Turkington, Associated Factory Mutual Fire Insurance Co.

The committee has both executive and judicial functions and will seek to correlate the recommendations for changes in the codes which are brought in by the various article panels. Those from the West named on the article panels and the articles of the National Electrical Code on which they will work, are as follows: Victor Moulton, Mountain States Inspection Bureau, Denver—Articles 230, 600, 730; L. A. Rice, Electrical Products Corp., Los Angeles, the same; L. W. Going, chief electrical inspector, Portland—Articles 300, 310, 400, 410, 420, 422, and he is chairman of the panel for articles 346, 348, 350, 352, 354, 356, 362, and 364; W. L. Gaffney, chief electrical inspector, Tacoma—Articles 370, 373, 374, 380, and 384; M. T. Crawford, Puget Sound Power & Light Co., Seattle—Articles 610, 615, 620, 630, and 670; E. E. Carleton, California Division of Industrial Safety, Los Angeles—Articles 450, 460, 470 and 710; A. C. Miller, Pacific Gas and Electric Co., San Francisco, and A. C. Veit, county electrical inspector, Los Angeles County—Articles 520, 530, 540, 640, 650, and 810; and H. C. Rice, Southern California Edison Co., Los Angeles, and G. Tansey, chief, electrical division, Los Angeles—Articles 720, 725 and 800.

It is expected that the new set-up will be discussed and explained at each of the section meetings. First section meeting will be of the Western Section at Denver, Sept. 13-15. The Northwestern Section will meet at Salt Lake City, Sept. 20-22, and the Southwestern Section in Oakland, Sept. 27-29.

Charles L. Smith, secretary-treasurer of the IAEI, as well as field engineer of NFPA, will make his first trip to the West in this capacity during this series of meetings. He will undoubtedly explain the new organization of the electrical committee and the purpose in changing it. Opinions were expressed last year that the electrical committee had become too big and too costly to operate in that fashion and the new plan would simplify operations. However, inspectors in the West felt that something of the democracy of the National Electrical Code might be lost if the large open forum on code questions was abandoned.

J. G. Fisher, president of IAEI, and superintendent of the electrical department, Mississippi State Rating Bureau, Jackson, Miss., will also attend the three meetings.

All of the meetings have been set up to provide considerable code discussion and to submit proposed changes. Besides this speakers will present pertinent topics at each of the meetings. Reports on the three meetings will be published in ELECTRICAL WEST following shortly thereafter.

● PUGET SOUND Chapter, IAEI, will hold its next meeting at Vancouver, Wash., Sept. 11. Previous meeting scheduled there was called off because of flood conditions. Subject will be *Silicone Insulations and Lubricants*, and will be presented by representatives of Owens-Corning Corp.

Unification Asked

Revision of requirements for temporary service on construction jobs came before the Northern California Chapter, International Assn. of Electrical Inspectors, at its Aug. 21 meeting in San Francisco, presided over by James Ambrosi of Oakland, chairman. Efforts are being made under the guidance of the Public Utilities Commission, the State Division of Industrial Safety, the utilities, and others to unify the requirements for temporary service equipment on construction jobs. Previous installations authorized use of too small a pole. Some of these have fallen over and caused injury. All inspectors were requested to send in their ideas to the Division of Industrial Safety to be correlated into a state-wide standard.

Another confusing problem, the conflict of ideas between the state fire marshall's office, the public health office, the National Electrical Code, and the state safety orders on requirements in hospital operating rooms was also brought up by Harold Gerber, consulting engineer and former inspector. It was moved that a committee be appointed to meet with all the interests involved and to attempt to get unified requirements for the state.

This problem and a recommendation of the Inspectors Luncheon Club for auxiliary sources of power in theaters, hospitals, and places of public assembly, were passed on to the section for consideration. Ben C. Hill, past president of the IAEI, reported on a recent meeting of the finance and advisory committees in Chicago at which it was decided to omit the publication of 1947 proceedings. Future proceedings will be included in the News-Bulletin. Several other matters of similar nature will be submitted to the annual meetings of the sections this fall.

The committee studying the recommendations for changes to Article 430, as originally submitted by the Southern California Chapter, reported against these recommendations. Next metting will be held Nov. 6 at Napa.

● A GET-ACQUAINTED party in preparation for the forthcoming Northwestern Section annual meeting in Salt Lake City was held by Utah Chapter, IAEI, as a picnic at Storm Mountain Resort, Aug. 3. From secretary Laurence E. Baty's amusing minutes of the occasion the meeting served its purpose. Business was forgotten for the time being. At the previous meeting in June the main topic had been behavior of steel conduit under corrosive atmospheric conditions.

"Give It All You've Got!"

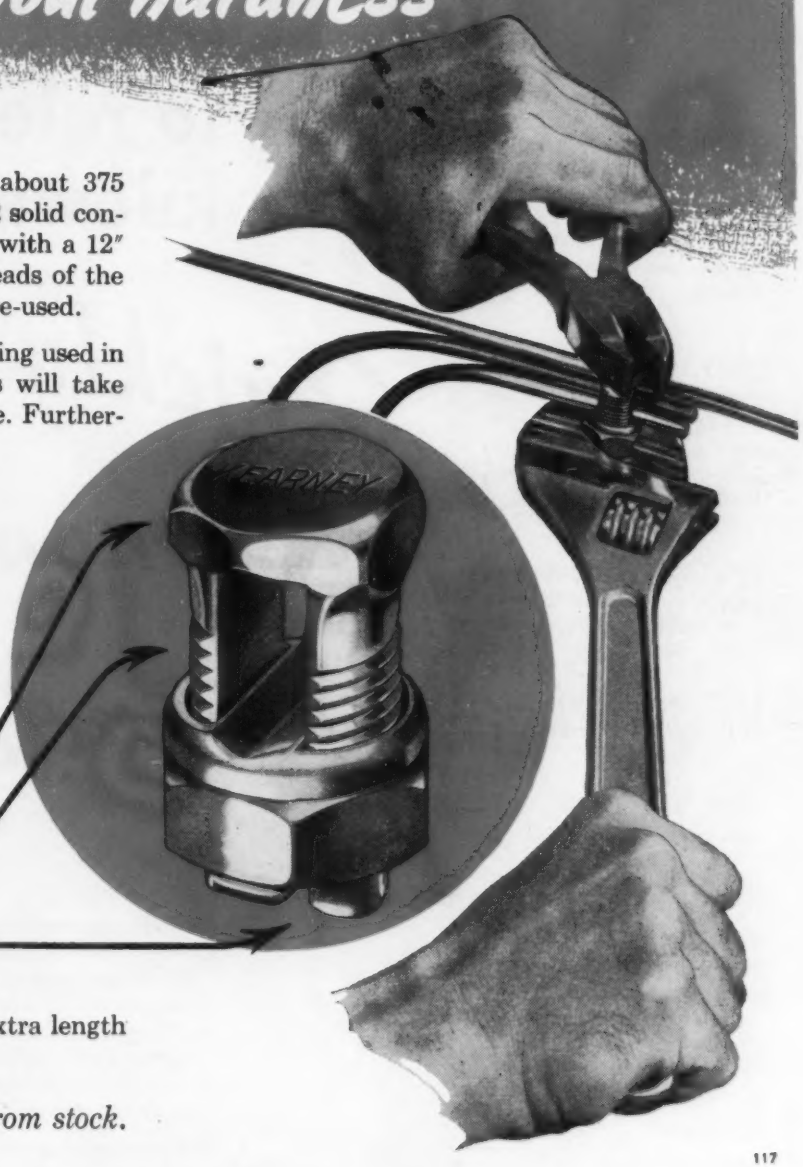
KEARNEY Con-Nec-Tites

toughness without hardness . .

On the average, a lineman will exert about 375 inch-pounds torque in tightening a No. 2 solid connector. This means only 31 pounds pull with a 12" wrench, but it is enough to foul the threads of the ordinary connector so that it cannot be re-used.

The new tough Kearnalloy metal now being used in the manufacture of Kearney connectors will take exceedingly high torques without damage. Furthermore, because Kearnalloy is tough but not hard, you need have no fear of nicking or otherwise damaging your line conductor.

When you use Kearnalloy, you get oversized connectors of high (80%) conductivity, capable of withstanding wrench torques far beyond what the average lineman can exert.



1 **Strong hexagonal head provides firm wrench seating — prevents slipping.**

2 **Clean threads and correct slot width provide smooth engagement—prevent slipping and binding on conductor.**

3 **Thread pilot makes possible easy starting.**

Con-Nec-Tites in 2—4—6 sizes provide extra length bolts to receive three full size wires.

Available for immediate shipment from stock.

117

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CAPACITORS ARE READY!

to release extra kilowatts for you

Quickly - - - - - - - - -

Economically - - - -

Dependably - - - - -

1948 New 3-kva, 240-volt capacitor introduced by G.E. made it economical to use low-voltage outdoor capacitors on secondary house feeder lines of distribution transformers.

1947 First 25-kvar individual unit introduced by G.E., with Pyranol, welded drawn steel cases, glass bushings and new improved kraft paper.

1947 Glass bushings with permanent hermetic seal, introduced by G.E.

1937 Outdoor individual unit first introduced by G.E.

1932 15-kvar individual unit introduced by G.E.

1931 Pyranol introduced by G.E., permitting reduced size and weight.

1930 10-kvar, oil-filled unit introduced by G.E.—first of its kind.

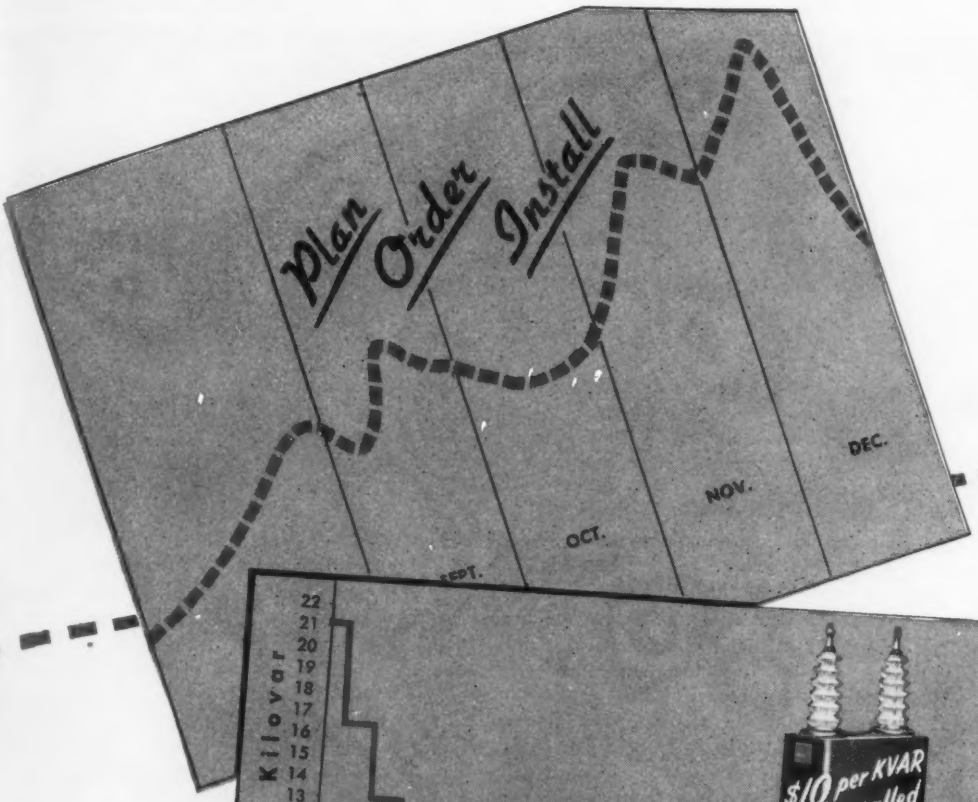
1930 Thin kraft paper first introduced by G.E.

Capacitors are ready—in every way—to help you to release additional kilowatt capacity.

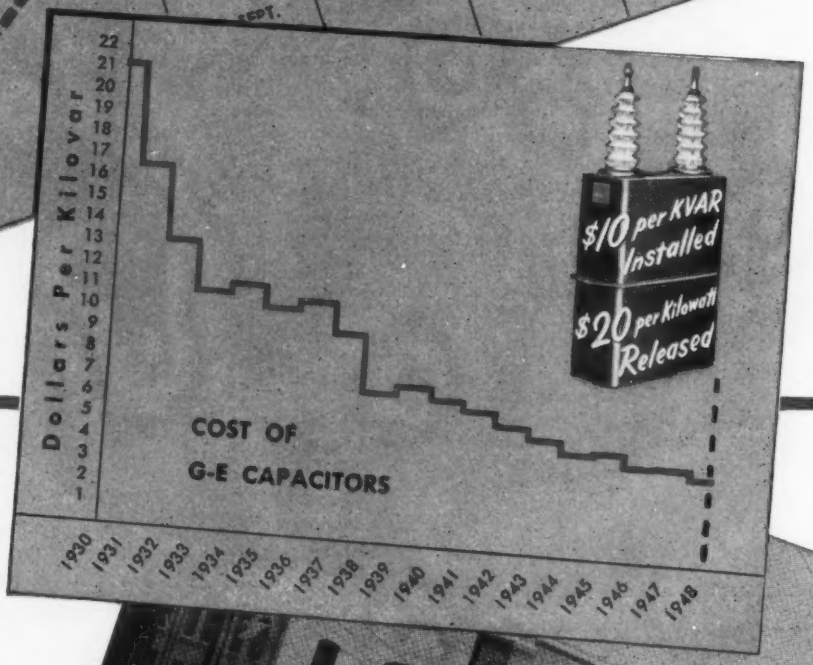
The 18-year span of capacitor progress shown at the left is highlighted by two facts of great significance to system planners today: (1) Capacitor prices have dropped, until today you can buy five capacitors for the cost of one in 1930! (2) Capacitor design made such remarkable strides that, today, capacitors are one of the most dependable types of electric equipment you can buy.

What does this mean—today? Simply this: More and more system planners are turning to capacitors as a way to release extra peak-load kilowatts. The cost, they find, is almost unbelievably low—about $20 a kilowatt! What's more, capacitors release those $20 kilowatts *quickly*.

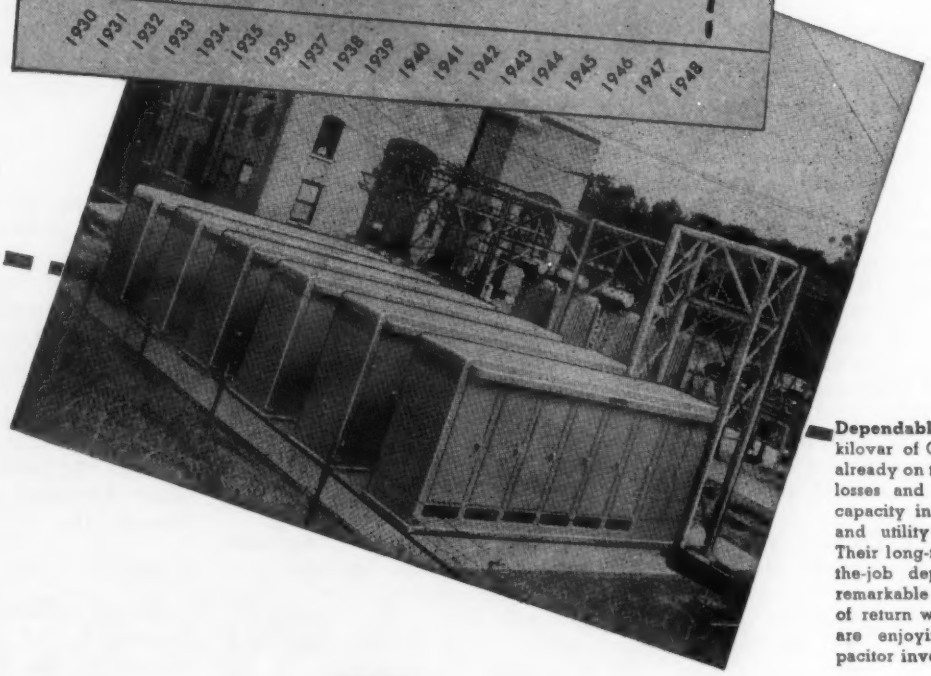
Have you "looked into" capacitors as a means to release extra system kilowatts today? If not, you may have a pleasant surprise ahead. G-E application engineers will be glad to work with you to find out how many kilowatts you can release, and how much you can save. Call your G-E sales representative today. He is ready to give you quick help and short delivery of capacitors. *Apparatus Dept., General Electric Company, Schenectady, N. Y.*



Quickly You still have time to plan, order and install G-E capacitors to release extra system kilowatts for the December load peak. G-E application engineers will be glad to work with you. Your capacitors can be shipped promptly—usually right off the shelf!



Economically Yes, $20 per kilowatt released. For example, a kva-limited system with a peak load of 100,000 kw at 85% power factor can deliver 112,000 kw after installation of 25,000 kva of capacitors. The extra 12,000 kw cost about $20 each.



Dependably Over ten million kilovar of G-E capacitors are already on the job—reducing losses and releasing system capacity in industrial plants and utility power systems. Their long-term record of on-the-job dependability is as remarkable as the high rate of return which their owners are enjoying on their capacitor investment.

GENERAL ELECTRIC

407-G

PANORAMA OF THE PCEA

Edited by A. X. Schilling

Conference Plans

PLANS for the annual fall conference, scheduled to be held in Fresno on Oct.28 and 29, were formulated when the three section guidance committees met in San Francisco Aug. 4.

The conference will open on Thursday morning at the Hotel Californian, with the opening address given by President M. G. Sues. H. H. Courtright, immediate past president, will welcome the delegates and the session will continue until noon. One of the morning's features will be an exposition of the growth of electrical manufacturing in PCEA territory by George C. Tenney, McGraw-Hill Publishing Co.

The Business Development Section will meet Thursday afternoon as a unit to hear reports from its farm electrification committee, liquefied petroleum gas committee, and advertising committee. In addition, there will be talks on radiant heating, commercial electrification, industrial power, and commercial and industrial lighting. The section will again meet as a unit on Friday morning to hear reports from its electrical living committee and the following sub-committees: adequate wiring; home lighting; modern kitchen; home laundry; home economists; television and radio.

The Administrative Service Section will meet as a unit Thursday afternoon for a program devoted to personnel problems and to a presentation of a California Bank training program on the detection of fraudulent documents. On Friday morning, the section will divide into discussion groups devoted to these topics; purchasing and stores; accounting; credits and collections; and personnel.

The Operating Economics Section will divide into separate discussion groups on Thursday afternoon to discuss: steam generation; hydro generation; transmission and distribution; substations; meters and metering; and transportation. On Friday morning, the section will gather as a unit for a program on *Utility System Operation.*

There will be no organized luncheon on Thursday, but all delegates will reconvene for a luncheon planned for Friday.

Administrative Services Section guidance committee members for this year are: J. K. Uhler, chairman, Southern California Edison Co.; L. W. Brillhart, vice-chairman, PG and E; C. B. Bradshaw and P. C. Hale, Southern California Edison Co.; E. J. Wright and H. B. Roundtree, San Diego Gas & Electric Co.; E. C. Bruce, Coast Counties Gas & Electric Co.; K. L. Boosey and J. F. Brennan, PG and E.; C. H. Warner, General Electric Co.; W. F. Ruth, California Electric Power Co.

Business Development Section guidance committee members are: J. S. C. Ross, chairman, PG and E; C. L. Moore, vice-chairman, Sunbeam Corp.; R. I. Mendes and E. G. Stahl, PG and E; F. M. Raymond and E. W. Meise, San Diego Gas & Electric Co.; H. C. Rice and G. N. Hawley, Southern California Edison Co.; W. H. Thompson, Westinghouse Electric Corp.; W. A. Cyr, ELECTRICAL WEST; K. L. Hampton, Valley Electrical Supply Co.; E. R. Grey, California Electric Power Co.; Milo Cain, Coast Counties Gas & Electric Co.; S. W. Scott, Graybar Electric Co.

Operating Economics Section guidance committee members are: D. R. Jenkins, chairman, Westinghouse Electric Corp.; F. D. Beardsley, vice-chairman, Coast Counties Gas & Electric Co.; E. B. Kipp and W. A. Zitlau, San Diego Gas & Electric Co.; W. R. Gielow and E. C. Hunt, PG and E; A. A. Straub, Southern California Edison Co.; C. G. Crawford, Pelton Water Wheel Co.; G. R. Best, General Electric Co.; Don Umphrey, Pacific Electric Mfg. Co.; J. A. Longley, Allis-Chalmers Mfg. Co.; C. H. Rhudy, California Electric Power Co.; T. B. Jones, General Cable Corp.

Committee chairmen are: highway lighting, I. W. Borda, Okonite Co.; technical sub-committee, G. W. Rankin, Southern California Edison Co.; communications, R. H. Miller, PG and E; agriculture electrification, E. G. Stahl, PG and E; sub-committee on handbook revision, Thor Christensen, PG and E; liquefied petroleum gas, R. I. Mendes, PG and E; resolutions, George C. Tenney, McGraw-Hill Publishing Co.; budget and finance, H. H. Courtright, PG and E; meter, E. B. Kipp, San Diego Gas & Electric Co.; safety rules, E. C. Hunt, PG and E; code & ordinance, P. L. Mullenbach, Mullenbach Electrical Mfg. Co.; publicity, W. O. Kyte, General Electric Co.; advertising, F. M. Raymond, San Diego Gas & Electric Co.; membership, S. W. Scarfe, General Electric Co.; electrical living, E. W. Meise, San Diego Gas & Electric Co.; sub-committee on home lighting, W. H. Thompson, Westinghouse Electric Corp.; sub-committee on modern kitchen, E. B. Barnes, Nash-Kelvinator Corp.; sub-committee on home laundry, Earle Germaine, Leo J. Meyberg Co.; sub-committee on home economists, Marguerite Fenner, PG and E; sub-committee on television and radio, H. C. Rice, Southern California Edison Co.; sub-committee on adequate wiring, J. H. Adams, Southern California Edison Co.

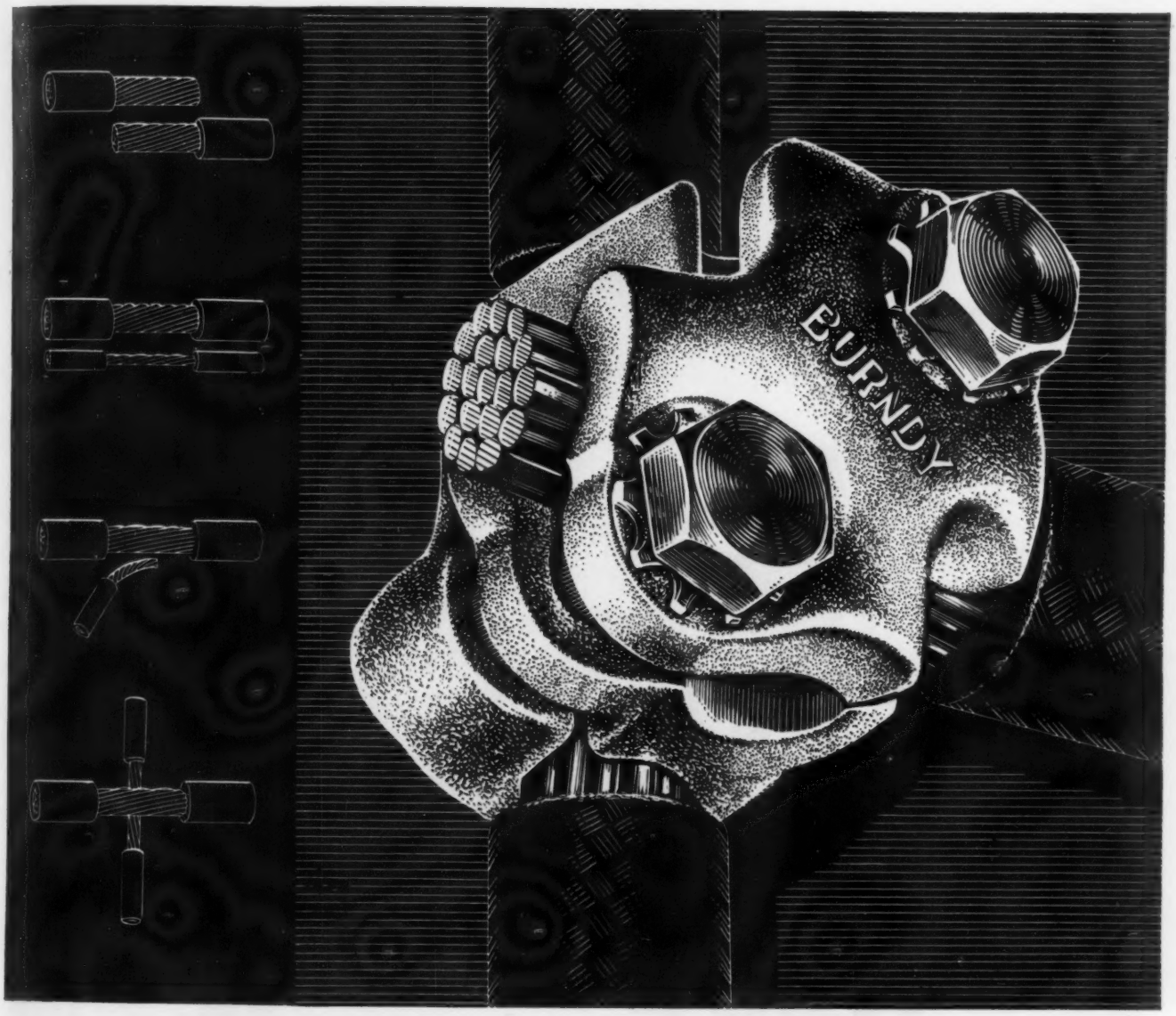
By the middle of August, 42 cities and one county had adopted the latest (1947) Uniform Electrical Code. In addition, 67 cities, three counties and one fire district were using the earlier version.

NISA

West Coast groups of the National Industrial Service Assn. were visited by president William Giles during late July and August. Giles met with the newly formed chapter at San Diego, then in Los Angeles, San Francisco Bay region, Portland, Seattle, and Vancouver. Of the 12 new chapters organized during the past year four were on the Pacific Coast. President of the association is owner of Giles Armature & Electric Works, Marion, Ill.

NARC

Among officers of the National Association of Refrigeration Contractors in the West are J. H. Lessard, Automatic Refrigeration Co., Seattle, who is second vice-president; Lee Shirar, Shirar-Young Refrigeration Co., San Francisco, director, and chairman of the labor relations



*Burndy Versi-Tap** . . . the versatile connector that makes short work of tee, tap, cross, or end connections. Each size accommodates a wide range of wires or cables in each clamping groove; so a few sizes on hand will take care of almost any combination of cables. Combines high strength and high electrical efficiency. Connects with ordinary wrench and tapes easily because of compactness and rounded corners. Sizes for conductors from No. 6 str. to 1000 Mcm. For full details ask for catalog 41; and remember, for versatility and economy, it pays to

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Look to Locke for the new ideas

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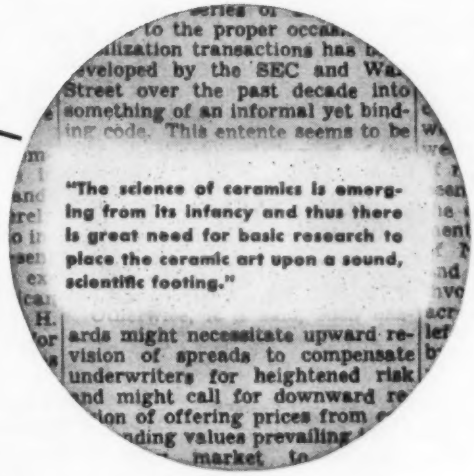
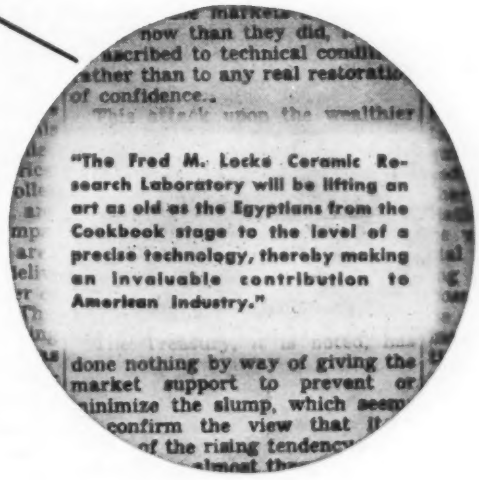


"The science of ceramics is emerging from its infancy and thus there is great need for basic research to place the ceramic art upon a sound, scientific footing."

FROM THE NEW YORK TIMES



"The Fred M. Locke Ceramic Research Laboratory will be lifting an art as old as the Egyptians from the Cookbook stage to the level of a precise technology, thereby making an invaluable contribution to American industry."

This new Ceramic Research Laboratory is just another example of Locke's determination to make certain that you receive insulators—and other porcelain products—which are produced under conditions of manufacturing excellence which are unsurpassed.

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55 YEARS EXPERIENCE IN HARDWARE AND INSULATORS

committee; and W. W. Allison, Los Angeles, who is Region 6 member on the trade relations committee. Robert M. Gay of Gay Engineering Co. is a member of a new committee on licensing and codes, with T. C. Alexander of Denver on the same committee for Region 5.

Electric Clubs

The story of copper from mining to wire and cable was presented to the San Diego Electric Club by Harold Q. Noack, Pacific Coast manager, Phelps-Dodge Copper Products Corp. for its Aug. 3 meeting. William DeWard was chairman of the day.

It was "G-E Day" at the August 17 meeting of the San Diego Electric Club. Program was a motion picture titled, *Power*, presented by General Electric. Chairman of the day was Herb Cordes, manager of General Electric of San Diego.

NECA

Portland Chapter of the National Electrical Contractors Assn. has appointed a new manager, Larry Rogers. The new Portland manager has had considerable labor relations work in war industries. Several divisions of the Oregon group may later be formed in order to serve the populations centers such as Eugene, Salem, Medford, etc.

Considerable organization work is being done in western Washington by E. R. Cornish, field representative of National Electrical Contractors Assn. with a view perhaps of forming more chapters in that area or of arranging for branches of what has been the Seattle Chapter. The Seattle Chapter of NECA has had the King County territory but meetings have been held in the area to determine whether other chapters could be set up or not. In a letter to contractors in the region Cornish invited participation in the NECA, either as already organized groups or by joining the existing chapter.

Directors of the Northern California Chapter, NECA, held the quarterly meeting at Santa Cruz July 31. Cecil Searle, vice-chairman, Santa Cruz, presided. Chief topic of discussion was the recent labor negotiations in the area and particularly the settlement of the Alameda and Contra Costa county disputes. The board authorized the reestablishment of the Oakland office as the recipient of payments into the employees benefit fund.

IES

The National Technical Conference of the Illuminating Engineering Society is scheduled for Boston, Sept. 20-24. This year there are no Westerners on the program except two who might be called ex-Westerners: W. G. Darley,now of Texas, and G. B. Buck II, son of Gaylord Buck of Denver.

Utah Chapter of IES had a special meeting during the visit to Salt Lake City of James Ketch, General Electric Co., Cleveland. The group met in the board room of Utah Power & Light Co. to hear a discussion on school lighting by Ketch.

IAEL

Annual conference of the managers of electrical leagues, the International Association of Electrical Leagues, will be held at Mayflower Hotel, Washington, D. C., Sept. 29-Oct. 2. On the program committee J. Clark Chamberlain, secretary-manager, Bureau of Radio & Electrical Appliances of San Diego County, is named. It is not unlikely that a move will be made to bring the next annual conference of this organization to the West Coast.

RMEL

Too late to include in the last issue and too early to report on in this issue are some of the speakers scheduled for the Sept. 13-15 annual convention of the Rocky Mountain Electrical League at Glenwood Springs, Colo. Ralph B. Hubbard, RMEL manager, announced that speakers would include Tomlinson Fort, manager, Central Station Sales for Westinghouse Corp., subject—Blazing Trails with Electricity; William A. Ritt, manager of Electrical League in Minnesota, Coordination Pays Dividends; H. L. Ehrlicher, General Electric Co., vice-president in charge of purchasing, Can We Deliver the Goods; R. G. Belleza, Locke Insulator Co., Baltimore, subject—Insulating the Future; J. W. Mullally, Anaconda Wire & Cable Co., Teamwork among Manufacturers, Distributors, Dealers, and Utilities; and John E. Loiseau, president, Public Service Co. of Colorado, The Rocky Mountain Story. Dr. Adam S. Bennion, vice-president, Utah Power & Light Co., Salt Lake City, was scheduled to deliver the banquet address on a subject dealing with public relations. George M. Gadsby, president, Utah Power & Light Co., has also been asked to speak and William A. Cyr, associate editor, Electrical West, to present an adaptation of his talk *What an Association Can't Do—and What It Can*. Theme of the convention will be "Forward Into Opportunity." Entertainment features will include a trip to Aspen or a journey to Rifle, Colo., for an inspection of the novel oil shale plant located there.

NEWA

Preliminary announcement of the Pacific Zone Convention of National Electrical Wholesalers Assn. to be held at Hotel Del Coronado, Calif., Oct. 4-6, has been made by E. E. Karsten, Gough Industries Inc., chairman, and R. A. Balzari, secretary of the Pacific zone. Reservations are being made through the office of the secretary at 101 Post St., San Francisco. The program will consist of a closed meeting for members Oct. 4 in the afternoon and general meetings for members and guests on Tuesday and Wednesday mornings. This year an innovation will be tried. The ladies who attend the convention will be given a special meeting on Wednesday morning as a part of the general meeting for members. "Many of the ladies have expressed a desire to contribute, if they could, to the promotion of interdependence within the electrical industry," says Karsten. "Therefore a very interesting meeting is being arranged for them on our regular program at 10 a.m. Wednesday morning."

IAEI

News of the death of Victor H. Tousley, secretary-treasurer of IAEI, saddened the meeting of the Southern California Chapter July 28 at Culver City. Arthur Veit, who had attended the meeting of the finance and advisory committee of IAEI in Chicago in June, told of having contacted Mr. Tousley at the time.

Inspector problems included difficulties in obtaining 10-ft. clearances for service drops and hazardous conditions discovered where building contractors connect to utility lines without a wiring permit for temporary power.

Harry V. Dobson presented a minority report for a committee appointed to suggest recommendations for radiant heating installations not covered by the code. He described five different types of radiant heating installation and explained his recommendations. It was suggested that the subject be discussed further at the Southwestern Section meeting in Oakland on Sept. 27-29. Comments on the committee report on prefabricated house wiring standards were told about by Larry Trim and some changes are to be made in the report. Next meeting will be held at Santa Ana, Nov. 17.

THE PLASTIC BUILDING WIRE THAT WON'T "STRIP-TEASE"

Pull it hard over the edge of an outlet box. You'll be surprised how Densheath* insulation resists cutting and abrasion. Chances are you won't even dent it. Yet this thermoplastic building wire strips clean and easy.

You'll be happy, too, about Densheath's small diameter (more copper per conduit), smooth, slick finish (pulls through conduit with ease), flame resistance (Densheath will *not* support combustion), permanent, bright colors (for quick circuit identification)—and that Densheath is long aging and impervious to acids, oils and alkalies.

Recognized by The National Electrical Code for circuits up to 600 volts and temperatures to 140° F.—and for wet and oily locations—Anaconda's Densheath has what it takes to be a safer, more economical building wire. 48478

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THE MONTH IN BRIEF

Northwest Faces Power Shortage

A power shortage that may reach 4.5% of power pool capacity during peak hour is foreseen in the Northwest this fall by representatives of public and private power agencies making up the Northwest Power Pool. In conference at Tacoma last month, these men placed the probable peak shortage at 150,000 kw. and laid plans for conservation. It is expected that all classes of customers will be asked to curtail use of equipment during peak periods and to shift as much load as possible to off-peak hours. This is in the event that normal fall rains come; a long dry spell would mean a critical power shortage, the Pacific Northwest Utilities Conference committee declared.

DST Extension Asked in California

Continuation of daylight saving time is urged in California as a power conservation measure. It was estimated that southern California systems, well off in last winter's crisis, would be taxed to capacity if daylight saving time were abandoned this fall. Even with prospects for an additional 367,000 kw. by the end of the year, southern California engineers believed that, under standard time, there would be no power left over to allow a repetition of last winter's contributions to central and northern parts of the state.

USBR Ten-Year Plan Disclosed

Plans of the Bureau of Reclamation to quadruple capacity of its electric generating plants and to increase investments in power facilities nearly tenfold were revealed last month by a Congressional investigating committee. Covering a 10-year period from June 30, 1947 to June 30, 1957, the program calls for expenditure of 1,416,993,127 for electric generating and transmission facilities. This is exclusive of such joint irrigation-power facilities as water storage reservoirs. The bureau entered the program period with an estimated investment of $188, 675,184 in power facilities. Details of the new program were revealed when a subcommittee of the House Executive Expenditures Committee, during investigation of alleged propaganda activities secured a copy of a bureau publication — *Program for Power Development, 1948-1957*. Hitherto the report had been withheld from sources outside the Interior Department. In a directive dated April 22, 1948, Secretary Krug had warned that the document should not be released pending completion of the bureau's "entire program of irrigation and power development for the West."

Bureau Comments on Program

Its power program, the bureau asserts, will be "a coordinated part of the national development" of power sources, which will "supplement and parallel" the expansion of privately owned facilities "but not overlap it." Overbuilding of generating plants "will not occur" under either expansion program, it adds. The questionable part of the 10-year program, the bureau says, is not whether it is warranted but whether it will be large enough and soon enough to meet growing needs. According to the bureau, the program will (1) make "economically feasible" large multipurpose projects "greatly needed in the West"; (2) make available large quantities of low-cost power to consumers whose total requirements will not otherwise be met; (3) conserve "none-too-plentiful oil and gas resources" and cut down on increasingly costly coal now utilized for power production.

Revenue Figures Given

Tables contained in the report on the USBR 10-year program fix annual revenues from power in 1957 at $123,300,000, at an average of 2.67 mills per kwh. for 46,000 million kwh. This compares with fiscal 1947 revenues of $22,472,000 at an average of 1.86 mills per kwh. for 12,070 million kwh. Average revenues will be increased, the report explains, because (1) more energy will be marketed at wholesale market distribution points, rather than at the plants as at present; (2) future hydro costs per kwh. must be higher to reflect increasing development costs. Details of projected developments will be found on page 151.

Shutdown Threatened

Boysen and Kortes dams in Wyoming were among the Missouri Basin projects in the news last month as Interior Secretary Krug and Congressional appropriation committee chiefs battled over funds. Krug warned that work shutdowns threatened due to exhaustion of appropriated money, suggested that USBR might be forced to transfer funds from other units. Representative Jensen and Senator Wherry, who head subcommittees on Interior appropriations, charged Krug and the bureau with "political maneuvering," pointing out that predicted money for Boysen Dam would run out about Nov. 15. Commissioner Michael Straus told a McGraw-Hill representative that every effort would be made to avoid closing down any projects during the current calendar year.

Sequel to Electricians Wage Dispute

Sequel to the dispute in Alameda and Contra Costa County over electricians' wages (reported in detail August ELECTRICAL WEST p. 120) is likely to be a general move for a $2.50 an hour wage rate for journeymen throughout the West. When the Northern California Chapter, Alameda and Contra Costa County branches, referred the wage issue to the Council for Industrial Relations in the Electrical Contracting Industry as arbitrators that council surprisingly backed the union and granted a $2.50 an hour wage beginning Nov. 15 and denied contractors wage protection on uncompleted work. This was done despite evidence presented that the $2.40 an hour rate was the pattern throughout the West. Immediately all other unions have reopened negotiations to raise the scale to $2.50 an hour. One significant fact—IBEW vice-president, Harry Broach, sat on the council instead of disqualifying himself after having handled negotiations in Oakland.

HANDY TIME SWITCH

. . . FOR 'ROUND THE CLOCK CONTROL OF ELECTRIC CIRCUITS

TYPE T-47

THE TIME SWITCH WITH 1,001 USES!

Lowest priced high-quality time switch ever offered by G-E, the Handy Time Switch fills countless needs among home-owners, farmers, businessmen, contractors. Easy to install and adjust . . . thoroughly automatic . . . accurate . . . has the widest time range of any comparable switch on the market (5 minutes to 22 hours)!

Poultry-house lighting—Increases productivity of laying hens by lengthening day. Can be set to turn on lights in the early morning, turn them off when it's daylight.

Process control—Combines labor saving with better quality control by timing heating processes, tumbling operations, and other industrial operations accurately, automatically.

Public building lighting—Saves electricity by automatically turning on lights in the evening, turning them off later at night.

GENERAL ELECTRIC SUPPLY CORPORATION

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SAN DIEGO • PHOENIX • SEATTLE • PORTLAND • TACOMA • SPOKANE

Another contribution to better anchoring...

- **GREATER HOLDING AREA.** This new Chance Anchor has 8 blades that expand to form a square, with equalized load distribution all around the anchor. Each blade is required to carry only one eighth of the load.
- **GREATER HOLDING POWER.** The 8-way Anchor expands in the shape of a cone and holds like a wedge against undisturbed earth on all sides. The pulling force is exerted over a wide area building up compression against an inverted pyramid of earth.
- **SIMPLE CONSTRUCTION.** There are no moving parts, arms, or mechanical devices to hinder the smooth operation of the 8-way anchor.
- **STURDILY BUILT.** It is designed to expand easily without sacrificing strength. Hinges will not collapse under strain and each of the eight blades is formed with a reinforcing rib that prevents buckling.
- **RETAINS SHAPE UNDER HEAVY LOAD.** Repeated pull out tests show that the blades will not collapse or bend under an extremely heavy load. These tests show that the new Chance 8-way Anchor develops more holding power under the same conditions than other expanding anchors of comparable size.
- **EASY, SURE EXPANSION.** The new anchor is easily expanded because the pre-formed blades cut into solid earth with a minimum of disturbance and the pointed corner blades make starting easy. It requires from 3 to 9 less blows to expand. Linemen can easily tell when the anchor is fully expanded by the sound of the top plate hitting the bell-shaped blade stop.
- **BLADES ARE SUPPORTED BY BASE PLATE.** Blades are supported in the cone shape so that they will not buckle down in the middle. The diagram at right shows anchor in expanded position and illustrates how base plate supports blades.
- **NUT RETAINER AIDS INSTALLATION.** The Chance Nut Retainer, shown in diagram, makes it easy to push anchor to bottom of hole. The anchor rod and nut cannot be pulled through the base plate.

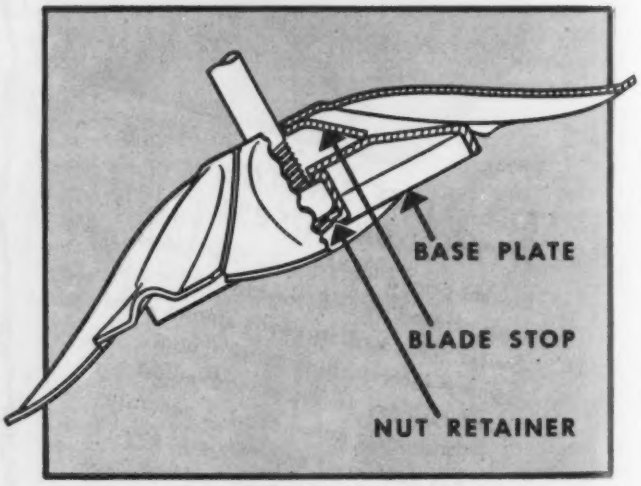


Diagram of Chance 8-way Anchor expanded, showing base plate, nut retainer, and blade stop.

More than 12,000,000 Chance Anchors have been put in service!

A·B·CHANCE CO·

...New CHANCE 8-way Expanding Anchor

Here is another answer to the problem of rapidly rising line construction costs! The new Chance 8-way Expanding Anchor gives you more holding power for less money.

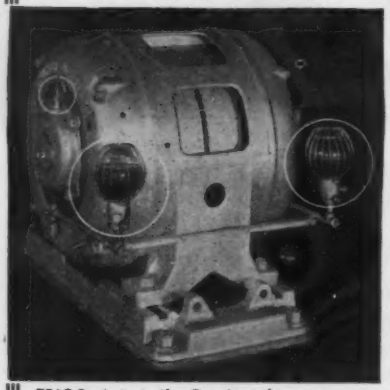
Better load distribution makes this new Chance Anchor stronger than other expanding anchors — and the absolute simplicity of its construction makes it the most smoothly operating expanding anchor on the market.

C4816

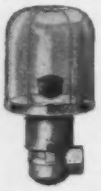
CENTRALIA, MO., SAN FRANCISCO, CAL.

ABC INDUSTRIES

TRICO AUTOMATIC OILERS
Insure PERFECT
BEARING PROTECTION



TRICO Automatic Constant Level Oilers keep maintenance costs down . . . speed up production . . . free men for other work. No guesswork, no hazards. ONE filling lasts a long time. Easily installed.



MODERNIZE WITH TRICO OILERS AND GET:
- Visible Oil Supply.
- Time, Oil, Worry Savings.
- Less Bearing Failures.
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THIS MONTH'S NEWS

Colorado Water Alloted To Upper Basin States

Members of the Upper Colorado River Basin Compact Commission, at a recent meeting in Vernal, Utah, agreed upon a percentage division of available water for the five upper basin states.

Under this tentative agreement, 50,000 acre ft. will be allocated to Arizona, a part of which is in the upper basin, leaving 7,450,000 acre ft. for distribution on the following percentage basis: Utah, 23%; Colorado, 51.75%; Wyoming, 14%; and New Mexico, 11.25%.

This plan, Utah State Engineer Edward H. Watson declared, "will permit building of hydroelectric plants along the river with power output roughly equal that of the Hoover Dam." He added that the proposed Bonneville Basin Reclamation Project in Utah in addition to Utah's Colorado River water probably will enable the storage of some 3,000,000 acre ft.

Commission members indicated that this compact, based on rainfall and storage capacity of each state, should comprise a basic step toward congressional appropriations for reclamation projects.

The commission will gather at Santa Fe, N.M., to sign the agreement officially. Legislatures of each state will then be called upon to ratify the agreement, which will then be submitted to Congress for passage.

The Lower Colorado River Basin consists of California, Nevada, most of Arizona, and parts of New Mexico and Utah.

Army Engineers Will Endorse Priest Rapids

The Corps of Army Engineers will recommend construction of the Priest Rapids Dam on the Columbia River below Wenatchee, Wash., Col. L. H. Hewitt announced after all testimony at a hearing in Wenatchee favored the project.

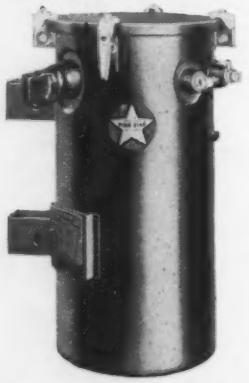
Spokesmen of the Puget Sound Power & Light Co. said the company should be recompensed for any power lost upriver at Rock Island Dam and Colonel Hewitt agreed. Revised plans for Priest Rapids call for a dam creating a pool 590 ft. above sea level, earlier plans for a 550-ft. level having been changed to permit flood control. In flood stage, the Priest Rapids dam probably would back up water to the Rock Island Dam.

The state department of conservation and development, the city of Portland, Ore., the Port of Vancouver, Wash., and chambers of commerce from Yakima and Longview favored the project from a flood protection view.

● BECAUSE of the large increase in customers, up 41% in Oregon this year, Portland General Electric Co. has announced a construction and improvement program in the Willamette Valley calling for expenditure of $1,070,000. Plans call for expenditure of $640,000 for major items of construction work and substation additions and $430,000 for customer service improvement. Largest single item in the program is addition and improvements to the Salem oil-fired generation station, to cost $160,000.

A COMPLETE LINE OF
PENNSYLVANIA TRANSFORMERS

***The* POLE STAR**



A new line of wound core distribution transformers made in sizes 25 KVA and below, 14400 volts and below, single phase, sixty cycles, OISC, conforming to EEI-NEMA standards.

A PENNSYLVANIA TRANSFORMER TO MEET ALL INDUSTRIAL OR PUBLIC SERVICE REQUIREMENTS

POWER	DISTRIBUTION
667 to 50,000 Kva.	3 to 500 Kva.
Up to 165,000 volts	Up to 66,000 volts

ASKAREL FURNACE — Up to 20,000 Kva.
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PG AND E BUILDING STEAM PLANT ON MONTEREY BAY

A 402,000-hp. steam-operated electric generating plant will be built by the Pacific Gas and Electric Co. near Moss Landing on Monterey Bay, Calif., William G. B. Euler, vice-president and general manager, announced last month.

The new power plant will have three 134,000-hp. generators. The power will be fed through new 220,000-volt and 110,000-volt transmission circuits into the PG and E network for northern California cities.

Four oil storage tanks with a total capacity of 480,000 barrels will provide fuel. Provision is also to be made to use natural gas to fire the boilers, and coal will be stored as an alternate fuel.

The first generating unit is scheduled to go into service early in 1950, while the other two are planned for operation a year later.

A 280-acre site was recently acquired by the company.

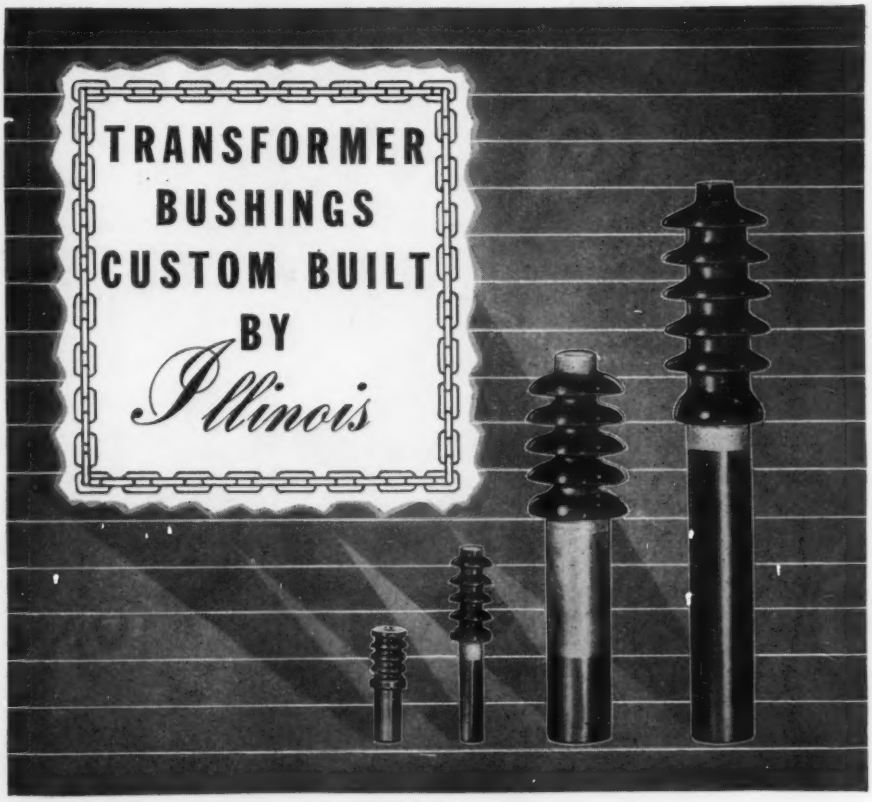
Kooskia Dam Opposed by Three Idaho Communities

Construction of the proposed Kooskia Dam on Clearwater River near Greer, Idaho, met strong opposition from three Idaho communities at a public hearing conducted at Kamish by Col. O. E. Walsh, Portland district engineer.

The three communities — Kamish, Kooskia and Stites — would be flooded by the dam's reservoir, as would two other settlements, 4,000 acres of farmland, 3,000 acres of timber and 16,000 acres of grazing land.

Colonel Walsh said the dam would provide 440,000 kw. of electrical energy. Army figures, based on the 1940 census, showed only slightly more than 1,000 persons whose homes would be inundated but spokesmen for the opposition declared the number would be at least 3,000.

● SEATTLE CITY COUNCIL has approved plans of E. R. Hoffman, City Light superintendent, to overhaul a turbogenerator in the Lake Union steam plant to expedite the system's power supply program. Hoffman warned the council that much overtime work will be required not only on the steam plant but on the Skagit hydroelectric project to meet power needs. Entire output of the Lake Union plant from its three steam turbogenerators of 30,000 kw. total capacity is being sold to the Washington Water Power Co. of Spokane for about nine months of the year, Hoffman said.



A chain is only as strong as its weakest link. Prevent weak links in your product by using ILLINOIS bushings produced to meet your engineers' most exacting specifications.

ILLINOIS' thorough control of production methods results in the manufacture of porcelain bushings of high dielectric and great mechanical strength, with the utmost in dimensional accuracy. Careful kiln drying and firing, at constant temperatures, prevent internal stress.

★

These bushings can be standard glaze or radio interference-proof glaze. Dry type bushings are produced for all voltages up to 34.5 kv. Gasket seats are smooth and ground when required.

Complete Uniformity
Exact Dimensions
High Dielectric Strength
High Mechanical Strength

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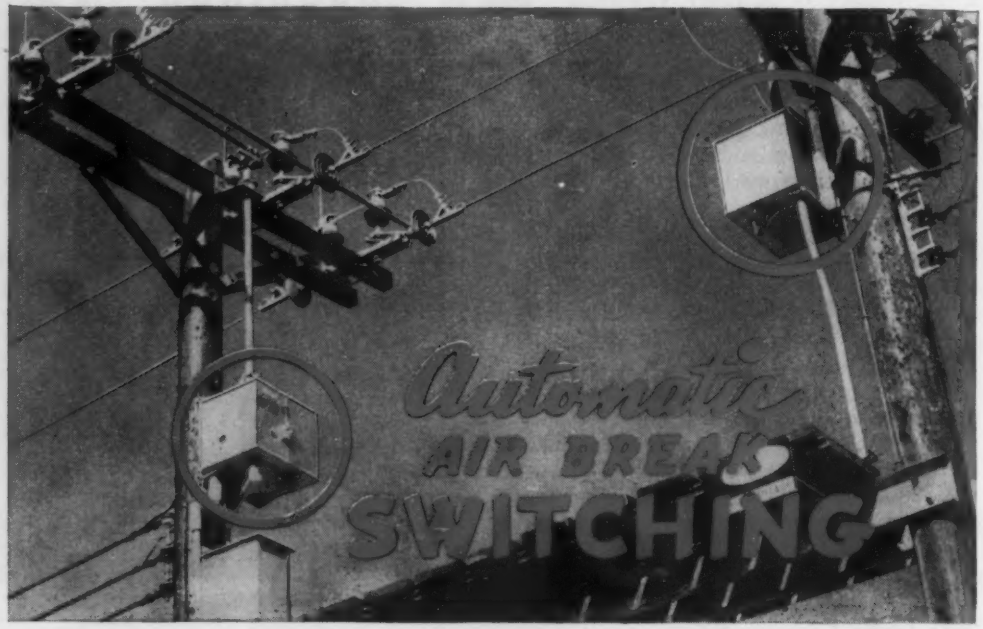
Specify Illinois Porcelain for Dependability and Economy

ILLINOIS
ELECTRIC PORCELAIN CO.
MACOMB • ILLINOIS

DEPENDABLE

Complete Constant Control

- **LOAD TRANSFER**
- **TROUBLE ISOLATION**
- **LINE SECTIONALIZING**



MINIMIZE CUSTOMER OUTAGES!

Assurance of uninterrupted power is a very important phase of your engineering program, particularly now with systems heavily burdened and output at an unprecedented level. Assure your customers of uninterrupted service through the use of Southern States' motor—or spring—operated mechanisms, or a **combination of both in the same cabinet.**

● LOAD TRANSFER

Can't afford power interruptions? Southern States automatic air break switches transfer a load **instantaneously**—or after a predetermined delay—from a preferred to an emergency source when trouble strikes, returns it upon restoration of voltage.

● TROUBLE ISOLATION

When faults occur, isolate them. Southern States automatic air break switches quickly isolate faulted branch lines, enable system service to continue.

● LINE SECTIONALIZING

Here, again, rely on **automatic** control. Southern States automatic air break switches are available for sectionalizing loop transmission and distribution circuits, and radial feeders. Switching equipment is also available for remote control by an operator.

Southern States Equipment Corp.

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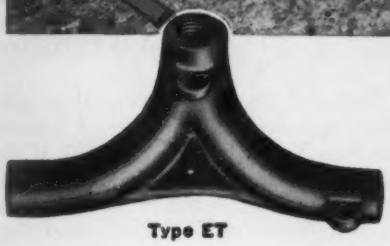
CROUSE-HINDS Large Radius Tees and Elbows . .

An electrical conduit installation using Crouse-Hinds Large Radius Type ET Tees in a mill before the concrete floor has been poured.

The same mill completed.



Type ET

Type ELB

Type EY

. . . simplify electrical conduit installation in concrete floors

Where electrical conduit is concealed the use of Crouse-Hinds Cast-Feraloy Large Radius Tees and Elbows results in substantial savings in installation and in maintenance.

Saves Material. These *CONDULETS eliminate the necessity for flush floor boxes.

Easy To Wire. The wires can be brought directly up to junction CONDULETS or motor controllers, where it is easy to make the necessary taps and splices.

Maintenance Reduced. Taps and splices are out of reach of oil, water, or cleaning solutions that may be on the floor, completely eliminating future difficulties from this cause. If necessary, any portion of the sectionalized circuit between two tees can be readily replaced.

Crouse-Hinds Large Radius Tees and Elbows are equally useful for ceiling and sidewall outlets. These CONDULETS are made of cast Feraloy, which is inherently corrosion-resistant. The hubs have the CONDULET features of tapered threads and integral bushings, designed for easy fishing. Lugs are provided for anchoring to concrete forms.

These CONDULETS are listed on Page 14, Section 65, CONDULET Catalog 2500. The complete CONDULET line consists of thousands of items . . . . engineered to enable the electrician to do the job and do it right.

*CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

A Nationwide Distribution Through Electrical Wholesalers

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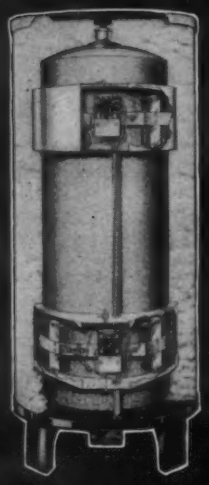
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

ELECTRIC "LIFE BELTS" for domestic hot water heaters



When water in municipal systems contains minerals and chlorine, it becomes a fairly efficient electrolyte.

To avoid electrolytic corrosion which may occur if dissimiliar metals are in contact with the water, the Toastmaster Water Heater employs "Life-Belt" heating elements attached to the *outside* of the tank. In such an application, the ability of the elements to give long, trouble-free, economical service rests solely upon the quality of the electrical resistance material used. *To assure top-level performance for a lifetime, the McGraw Electric Co., makers of Toastmaster Water Heaters, specifies Nichrome.**

The tank is further protected by McGraw's "Ionodic" system of corrosion prevention. Says the manufacturer: "We guarantee the Toastmaster Water Heater for 10 years—and deem this a conservative commitment. Life-Belt elements last almost indefinitely."

Profit by this example . . . and specify Nichrome. And remember, there are over 80 Driver-Harris alloys designed to fill the needs of the Electrical and Electronic industries—fully described in our catalog R-46.

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it's in the groove... ...and out!

High speed machine-winding of electric motor armatures necessarily exposes magnet wire to some rugged treatment.

The all-around (in the groove and out) "windability" of ESSEX EXTRA TEST MAGNET WIRE in this and other exacting applications cannot be excelled.

ESSEX WIRE CORP.

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WIRE SX PRODUCTS

Plants: Anaheim, Calif.; Detroit, Mich.; Fort Wayne, Ind. Warehouses* and Sales Offices: *Atlanta, Ga.; *Boston, Mass.; *Chicago, Illinois; Cleveland, Ohio; Dallas, Texas; Dayton, Ohio; *Detroit, Mich.; *Kansas City, Mo.; *Los Angeles, Calif.; Milwaukee, Wis.; *Newark, N.J.; Philadelphia, Pa.; *Portland, Oreg.; *St. Louis, Missouri; *San Diego, Calif.; *San Francisco, California

ARIZONA EDISON PLANS $7,500,000 EXPANSION

A construction program involving expenditure of $7,500,000 over the next four years was announced recently by Reid Gardner, president of the Arizona Edison Co. The company has obtained approval of the Arizona Corporation Commission to sell $1,000,000 in 3½%, first mortgage bonds to the Northwestern Mutual Life Insurance Co.

Proceeds of this sale, it was explained by Gardner, will be used to retire bank loans made last fall by the Valley National Bank and the Harris Trust and Savings Bank of Chicago, when the firm purchased the Arizona properties of the California Electric Power Co. in Yuma County.

Permission will be sought later this year to sell $1,500,000 of debentures and $300,000 in common stock to finance a portion of the construction program, making a total of $2,800,000 in financing for 1948.

Included in the construction program will be the bringing of natural gas into Yuma by Jan. 1, 1949, if the materials can be obtained in time.

Another item in the program will be the installation of additional generating units at Yuma and in the Globe-Miami area, as well as at Coolidge, Casa Grande and Florence, with corresponding expansion of the distributing systems. The firm's Douglas-Bisbee generating plant also is to be increased in capacity.

Seattle City Light to Tell Merits of its Securities

With interest rates on its new bond issues increased about 1% in the past year, Seattle City Light is planning a specialized public relations program to inform securities buyers about the merits of the system's bonds.

"Not enough people who handle investment purchases are familiar with our achievements," Superintendent E. R. Hoffman told the City Council in explaining the higher interest rates. To meet this situation, City Light will spend $7,500 in preparing and printing a "special survey report" to be distributed to prospective bond buyers.

The matter of interest rates is of great concern to City Light, as it plans to sell millions of dollars in bonds during the next few years.

● GRANT COUNTY PUD No. 2 of Ephrata, Wash., has started action in superior court at Ephrata to condemn Washington Water Power Co. distribution facilities in the county.

WASHINGTON WATER POWER ADDS FOOTAGE ON DAMS

Washington Water Power Co. has added another foot on its Long Lake Dam and 5 ft. to its Nine Mile Dam to provide additional water storage for 2,000 extra hp., according to Richard McKay, assistant general manager.

Five additional feet of flashboard will bring total height of Nine Mile to 68 ft. About 1,000 hp. more will be generated continuously from the additional water storage. In previous years, 5 ft. flashboards were in use there. The flashboards are built the 225-ft. length of the spillway section in the 364-ft. long dam.

Four generators have been producing about 22,000 hp. at Nine Mile.

At Long Lake, largest of the company's eleven plants, raising the height of the dam one foot is providing water storage equal to another 1,000 hp. from the combination of water usage there, at the company's Little Falls plant farther downstream and at Grand Coulee Dam. Total height there is now 209 ft. This dam's four generators produce 93,000 hp.

Clark County PUD Officials Dismissed in Dissention

Three department heads of the Clark County (Wash.) PUD have been dismissed because of dissention over policies of the district manager, V. M. Cleveland.

The ousted men—Guy Burch, chief accountant, Hugh Whisler, superintendent of operations, and Kenneth Durgan, auditor—were accused of failure to cooperate with the manager, and of promoting discord in the staff.

The dismissals came as an aftermath to the petition to the district commissioners, signed by eight department heads, charging the manager with incompetance in failure to provide material fast enough for expansion of the district.

At a hearing on the charges, four of the signers asked permission to withdraw their names from the petition and will remain at their posts. A fourth, not present at the hearing, also agreed to remain.

The commissioners found the charges unfounded and voted to give Cleveland a free hand to straighten out the problem.

● REVENUES of the proposed PUD at Rainier, Ore., would be sufficient to pay operating costs and retire an investment of $234,000, according to a report by the Oregon Hydroelectric Commission. The area is now served by the Pacific Power & Light Co., which has 529 customers over 9.54 miles of electric line.

● COWLITZ PUD, Longview, Wash. was required to pay a $25,000 fee to Jack Cluck, Seattle attorney, after the finding of a three-man arbitration board. The fee was arbitrated after the district objected to Cluck's price for legal work he did in abrogation and renegotiation of a contract for supplying electrical energy between the PUD and the Longview Fibre Co. Cluck said his fee for the legal work was $125 per day, and that he and his staff had spent 200 days on the work.

● TUCSON (Ariz.) Gas, Electric Light and Power Co. has ordered a second 11,500-kw. steam turbogenerator to add to a unit of the same capacity which is now being built. The generator will cost $1,800,000 and will be placed in operation by October 1949. The first one will be working by next June. The two additions will boost production to 60,000 kw.

● FULL CASH VALUE of public utility property in Oregon has been placed at $412,353,854 by the state tax commission. Last year the cash value was $379,571,270.

Guiding core and coil assembly of a Gardner 50 KVA, oil-filled, self-cooled transformer as it is lowered into position in the tank.

Expert Attention

Every step in production under the care of an expert—that's the Gardner standard of transformer construction. Each detail checked and re-checked to assure that the completed transformer meets the specification. Maximum power output and low cost operation is assured by Gardner design, Gardner workmanship, and Gardner inspection.

Gardner Electric Mfg. Co.

EMERYVILLE 8 CALIFORNIA

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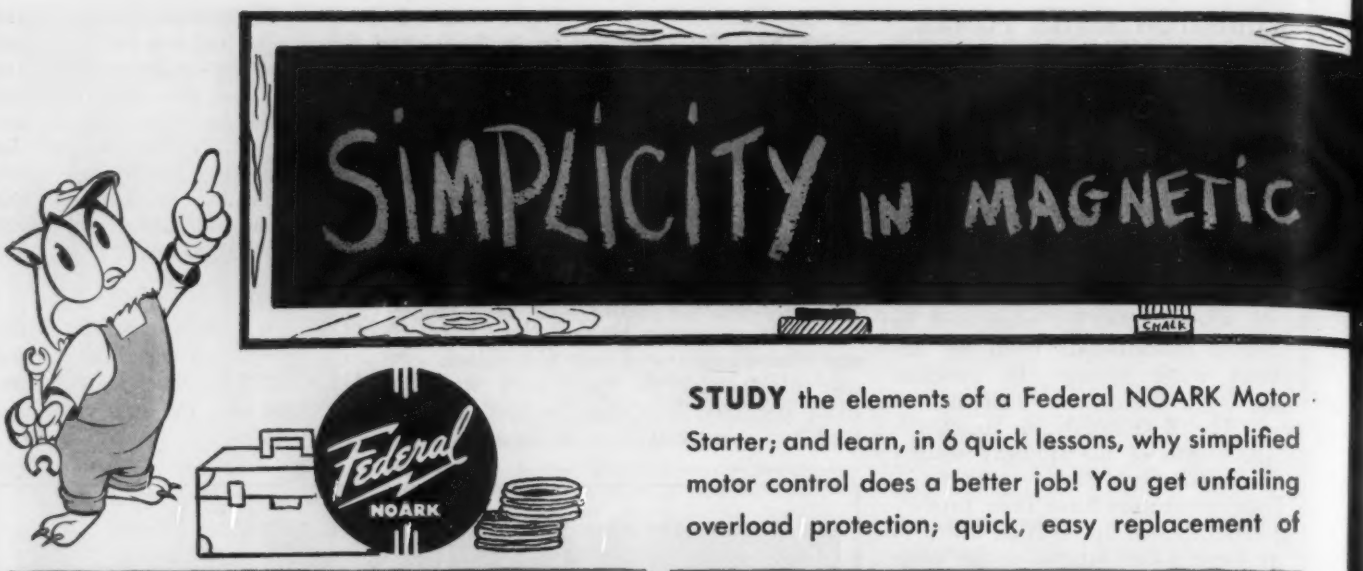
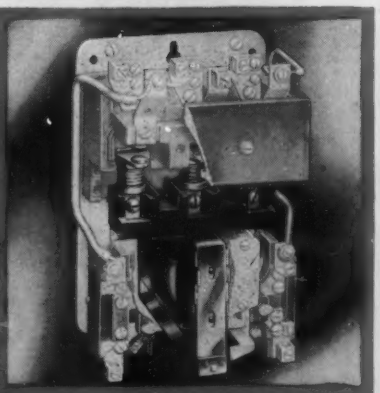
GARDNER TRANSFORMERS GUARD PROFITS



STUDY the elements of a Federal NOARK Motor Starter; and learn, in 6 quick lessons, why simplified motor control does a better job! You get unfailing overload protection; quick, easy replacement of

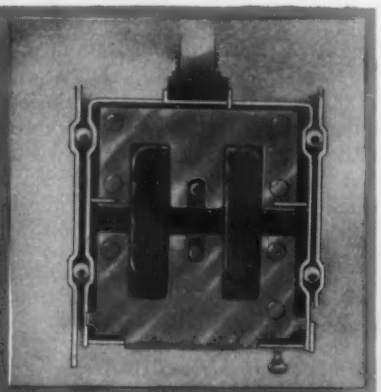
ONLY ONE MOVING UNIT



LESSON # 1

The SINGLE moving unit in Federal NOARK motor controls means less chance for trouble. Greatly simplified, the movable magnet and contact assembly, indicated in dark gray on the illustration, minimizes breakdowns and reduces maintenance costs.

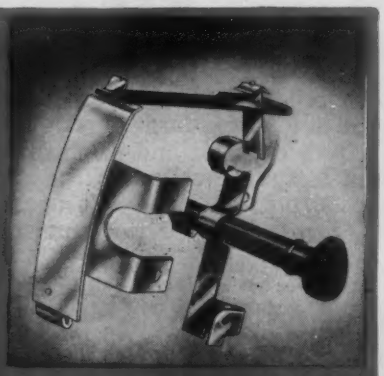
SMOOTH BALL BEARING ACTION



LESSON # 2

To eliminate friction, the ONLY moving unit in a Federal rides on ball bearings. Raceways guiding the balls are hardened to multiply the life of this moving unit. Mechanical trouble doesn't have a chance to develop in a Federal NOARK Starter.

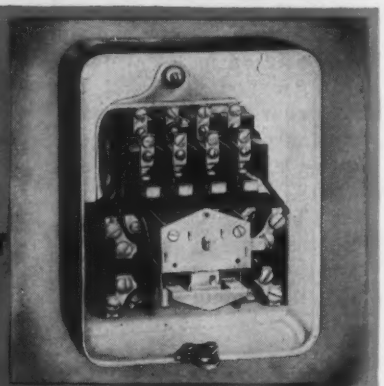
AUTOMATIC OR MANUAL RESET



LESSON # 5

Another great advantage of Federal NOARK motor controls is the choice of instantly getting either automatic or manual reset. By just turning the readily accessible red knob, you can secure the type of overload protection you want.

COMPLETE ACCESSIBILITY FROM THE FRONT



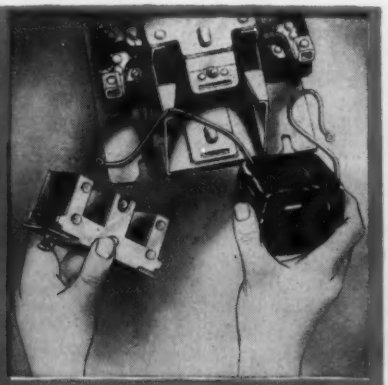
LESSON # 6

Armed with a screw driver, you can strip the entire Federal starter mechanism to the base without taking it out of the enclosure. That means that heaters and stationary contacts can also be quickly changed from the front. It's further proof that Federal NOARK motor controls can be quickly inspected and easily maintained.

MOTOR CONTROLS COSTS NO MORE!

coils and contacts; frictionless solenoid action that sees you through the heaviest production schedules. Federal NOARK gives you rugged, easily maintained motor controls that cost not a penny more.

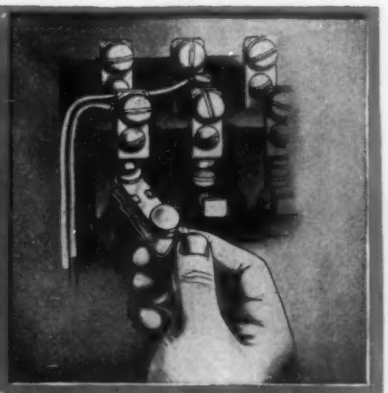
IMMEDIATE COIL REPLACEMENT



LESSON #3

Replacing a coil in a Federal NOARK Motor Starter is an A. B. C. operation. A. Press up the coil-retaining spring and pull it out. B. Loosen the screw and lift out the movable magnet. C. Disengage the coil leads and pull out the coil. A new coil goes in place in seconds!

INSTANT CONTACT RENEWAL



LESSON #4

Renewing double break, solid silver contacts in a Federal NOARK Motor Starter is simple. On size 0 and 1, just press the end of the one-piece contact down and pull; it comes out easily. Slide in a new contact and the job is done. Once in, it can't loosen or vibrate out.

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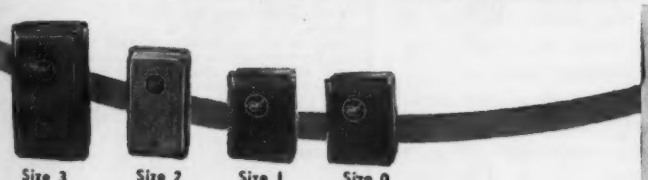

Size 3 Size 2 Size 1 Size 0

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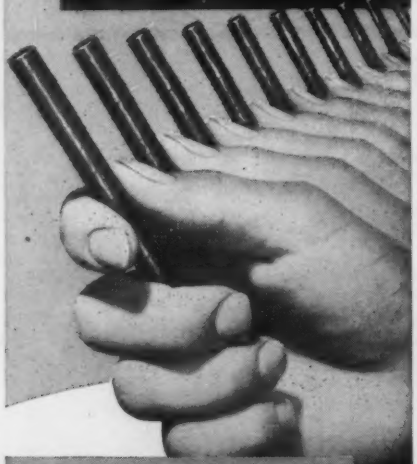

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NORTHWEST PUBLIC POWER GROUP HOLDS MEETING

A program to furnish 7,000,000 kw. additional power to the Columbia basin and give flood control was reported by Col. Theron D. Weaver, division Army engineer, at the annual meeting of the Northwest Public Power Assn. at Port Angeles, Wash., Aug. 11.

Among dams being "favorably considered" are Hell's Canyon Dam on the Snake River about 111 miles upstream from Lewiston, Idaho (850,000 kw.), and Priest Rapids Dam on the Columbia above Pasco, Wash. (1,200,000 kw.). Libby Dam on the Kootenai River in western Montana, John Day project on the Lower Columbia and Alberni Falls on the Pend Oreille River in northern Idaho also were mentioned.

Gus Norwood, executive secretary of the association, in a panel discussion on wages and working conditions, told the group that electrical workers in the Pacific Northwest are the highest paid in the nation.

Rep. Henry M. Jackson, Washington congressman, warned that the region's public power program "faces a real and present danger in the coming session of Congress." He believes the danger to public power will come in the form of riders to appropriation bills, which might ban any funds to Bonneville Power Administration if it sells power to a PUD which acquired private utility properties without a vote of the people.

Alberni Falls Dam is needed if the nine generators to be installed at Grand Coulee between 1949 and 1951 are to be effective, Norwood said. Completion of Hungry Horse Dam late in 1952 would level the flow of the Columbia enough for six generators, he said, but Alberni Falls is needed for the remaining three.

Ben Creim of the Bureau of Reclamation at Sacramento, Calif., reported on power shortage problems in California.

The group agreed that tremendous and continuing pressure must be put on Congress for adequate appropriations for more dams, generation plants and transmission lines. In the meantime, those in charge of existing facilities were given the responsibility of using their experience and ingenuity in managing the present load.

Carl C. Moore, manager of the Stevens County Cooperative at Colville, Wash., was elected president to succeed Clinton Hurd. Erick Johnson, manager of the Wasco Electric Co-op of The Dallas, Ore., was named vice-president and John R. King of Seattle City Light was re-elected secretary-treasurer.

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USBR PROGRAM PLANS HUGE EXPENDITURE IN WEST

Four steam plants—three in California and one in Velarde, N. M.—are included in the USBR projected 10-year program (see page 138). The New Mexico plant near Los Alamos is to be expedited because of urgent need for security reasons, the bureau states.

Projected capacity by states and projects is listed below. The report lists transmission expenditures for practically all of these projects within the 10-year period. In some cases, plant and transmission costs beyond the 10-year period are cited. Transmission alone for Fort Peck is estimated at $13,012,408, 1948-57 and $383,000 after 1957. Snake River Basin transmission is listed at $44,-815,432, substations, $15,913,000.

In northern and central California, it is proposed to build 3,599 miles of transmission line, at a cost of $118,-606,000. The bureau admits plans to supply energy at wholesale to municipally owned systems in several California cities now supplied by other sources. It also plans to extend looped lines to such points as Klamath Falls, Ore., and Reno, Nev.

Arizona: Hoover Dam, 165,100 kw.; Davis Dam, 225,000 kw.; Glen Canyon, 400,000 kw.; Marble Canyon, 22,000 kw.; Kanab Creek (1955-65), 1,250,-000 kw.; Bridge Canyon, 750,000 kw.; Headgate Rock, 27,000 kw.

California: Pilot Knob, 33,000 kw.; Central Valley, new units at Shasta, construction Keswick hydro and Delta steam plants, 540,000 kw.; Kings River, three new hydro plants and Fresno steam plant, acquisition and expansion Balch hydro plant; new capacity 205,-000 kw.; American River, three hydro plants, 202,000 kw.; Feather River, two hydro plants and Bakersfield steam plant (1953-58), 214,000 kw.; Trinity River, three hydro plants, 170,000 kw.; Eel River, two hydro plants (completion 1958), 29,800 kw.; Carson River, 45,000 kw. (completion after 1957); Walker River, three plants, 32,500 kw.

Colorado: Ouray, three plants, 116,-000 kw.; Animas-LaPlata, three plants, 42,000 kw.; Collbran, two plants, 7,-000 kw.; Colorado-Big Thompson, seven plants, 154,300 kw.; Blue South Platte, two plants, 36,200 kw.; Gunnison-Arkansas River, three plants, 77,350 kw.

Idaho: Boise Project, Anderson Ranch plant, two units, 27,000 kw.; Mountain Home, three plants, 165,000 kw.; Palisades, 30,000 kw.; Hell's Canyon, four units, 432,000 kw.

Montana: Hungry Horse Dam, 300,-000 kw.; Canyon Ferry, 36,000 kw.; Yellowtail, 120,000 kw.; Lower Marias, 1,600 kw.

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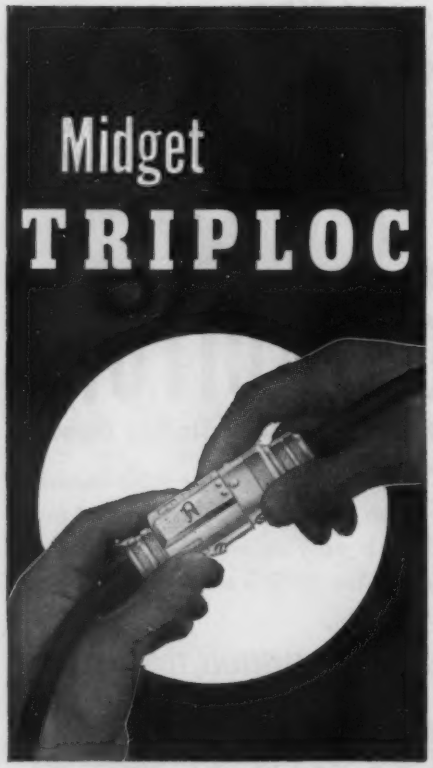

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USBR Power Development Program

(Fiscal Years 1948 Through 1957)

Existing June 30	Power plant cost by years	Transmission Line cost by years	Power capacity added yearly in kw.	Transmission line mileage per annum
1947	.....	.....	2,202,400	2,579
1948	30,000,988	18,986,616	675,000	633
1949	36,089,230	38,618,140	162,500	1,396
1950	75,805,688	54,338,696	715,600	1,721
1951	103,334,051	41,811,328	703,900	1,585
1952	120,110,562	49,918,173	565,900	1,130
1953	116,116,462	54,859,801	998,100	1,727
1954	100,340,997	75,706,135	663,998	1,700
1955	100,578,270	92,139,968	914,002	2,940
1956	103,330,072	83,779,420	1,399,800	3,850
1957	70,525,480	50,603,050	593,800	3,033

New Mexico: Rio Grande project, Caballo plant, 10,000 kw.; Middle Rio Grande, two hydro plants, 16,000 kw.; Velarde station plant, 22,500 kw.

Oregon: Rogue River, seven plants, 89,550 kw.

Utah: Dixie project, installation four plants, 17,000 kw.; Central Utah, six plants, 475,000 kw.; Weber River, three plants, 16,400 kw.; Provo River, Deer Creek plant, 5,000 kw.

Washington: Grand Coulee, addition eleven units, 1,964,000 kw.; Yakima, two plants, 22,000 kw.

Wyoming: Canyon, 70,000 kw. plant; Kendrick, Seminoe plant; Heart Mountain, 5,000 kw.; Missouri Basin, Alcova plant, 27,000 kw.; Kortes plant, 36,000 kw.; Boysen, 15,000-kw. plant.

● GRAYS HARBOR PUD at Aberdeen, Wash., has voted to offer the Puget Sound Power & Light Co. $1,024,000 for its properties in the county but Puget Power acceptance is unlikely. The offer is $76,000 less than the figure for which the company proposed to sell the properties recently. It is effective through Oct. 15 but Puget Power was expected to act shortly after Sept. 1, when President Frank McLaughlin returned to his office in Seattle. The PUD action countermands a resolution it passed last May, under which condemnation proceedings would have been started.

● THE KITSAP PUD of Bremerton, Wash., is negotiating with the Puget Sound Power & Light Co. for the company's properties in Kitsap County, C. Jack Jones, PUD president, has announced.

● UNITED RADIO COMMUNICATIONS was recently granted a license by the Federal Communications Commission to operate a mobile relay telephone service in San Diego, Calif., and has placed the system in regular service. Two-way service between automobiles or ships is relayed by a central office to telephone subscribers. William Trent German is owner of the company, which has received the designation W6XKB for its station.

● COWLITZ COUNTY PUD of Longview, Wash., has awarded an $88,187 contract for construction of a warehouse and office building. Plans call for a concrete structure, with 70x108-ft. basement garage, 70x108-ft. warehouse with enclosed loading area 27x44 ft., 42x30-ft. engineering office and a 20x30-ft. crew rooms, including lockers, shower and drying room.

● CONTRACT for construction of a 23-mile power line between Salem and Albany, Ore., has been awarded by the Bonneville Power Administration to the L. H. Leonardi Electric Construction Co., San Francisco. The 115,000-volt line will reinforce the overloaded circuit which furnished Columbia River power to the Central Lincoln PUD, Benton-Lincoln Electric Co-op, City of Eugene, City of Drain, Mountain States Power Co. and Lane, Douglas and Blachly-Lane county cooperative associations. The new transmission line will be of "H" frame-type pole construction. The Leonardi company's bid was $63,085, with materials and equipment to be furnished by the Bonneville Administration.

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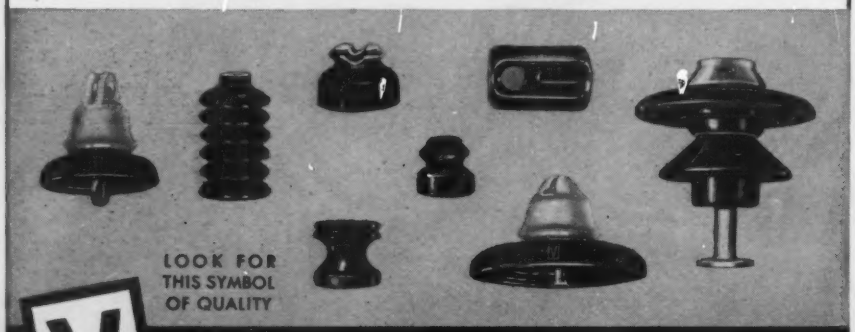

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NEWS ABOUT PEOPLE

● A. E. "Buck" Angell Jr. has joined the Oliver B. Lyman Company, San Francisco, as a switchgear and bus specialist. A native of Portland, he was graduated from Oregon State in 1938 in electrical engineering. From 1941 until 1946 he was in the Army, being discharged as a lieutenant colonel in the Corps of Engineers. He was in the I-T-E Circuit Breaker Co. Philadelphia office for a year before coming to San Francisco. Prior to joining I-T-E, he worked with Pacific Electric Mfg. Company and General Electric.

● AT A SPECIAL meeting held on July 30 the directors of the California Oregon Power Co. elected HERMAN PHLEGER of San Francisco to membership on the board to fill the vacancy caused by the death of James S. Moore Jr. Phleger is senior partner in the law firm of Brobeck, Phleger & Harrison, which has acted as chief counsel of the California Oregon Power Co. for several years.

● L. H. MILLER, Vancouver city electrical inspector, has been elected president of the Electrical Inspectors' Assn. of British Columbia for the coming year. L. Robson, provincial electrical inspector, is vice-president; J. Walker of New Westminster is treasurer. R. Hall, secretary of the Electrical Service League of British Columbia, is also secretary of the association.

● A. A. SCHUELER, general sales manager of the Square D Co. Western division, and treasurer of the Square D Co., has resigned his position, according to a recent announcement. Schueler has been with the company for 33 years. Prior to his position with the Western division, he was the national sales manager for Square D.

● R. E. FISHER, retired Pacific Gas and Electric Co. vice-president, has been appointed ECA power and fuel administrator for Italy by ECA Director Paul Hoffman. Fisher's headquarters will be in Rome.

● EDWARD E. LACY has been appointed Butte, Mont., manager for Westinghouse Electric Corp., according to an announcement made by S. M. Johns of Salt Lake City, manager of the firm's Salt Lake City office.

● J. B. SHAMEL, prominent Los Angeles electrical contractor, was elected president of the Los Angeles Building & Safety Commissioners on July 26. He has been a member of the commission in the past two years and has now been elevated to its presidency. He is a member of the Los Angeles Chapter, NECA, chairman of its labor relations committee, is the governor for the chapter and chairman of the Southern California Employees Benefit Board. He operates California Electric Construction Co. Considerable work in the frequency charge being made for Southern California Edison Co. is handled by his company.

● F. L. ALLEN, Ontario district manager of Southern California Edison Co., has retired after 39 years of service. G. L. BLANCHARD, assistant commercial engineer for the company's frequency change project, has been appointed district manager to succeed Allen.

● FRANK A. STEWART, managing director of the Washington State Public Utility Commissioners Assn., has been appointed director of the Washington State department of conservation and development. He was formerly with the Henry J. Kaiser interests at Coulee Dam and Vancouver, Wash.

● LANCE ROBSON has been named chief inspector for the British Columbia electrical department. He will have his headquarters at Vancouver, B. C.

Deaths

● JOHN P. "Jack" MCELROY, division sales manager of San Joaquin Power Division, Pacific Gas and Electric Co., died on August 5 at the age of 55. He was first employed by the San Joaquin Light and Power Co. in 1923. He served as agricultural engineer, power engineer and in 1943 was elevated to acting sales manager. In 1946 he was made division sales manager.

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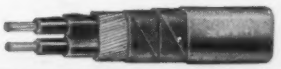

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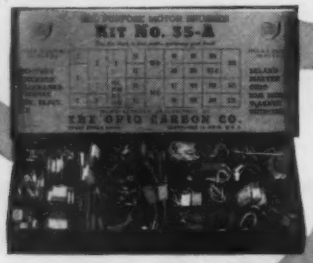

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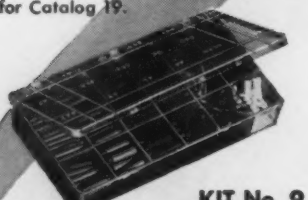

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NOTES ON THE TRADE

Sunnyvale Plant Entertains Delegation from Mexico

In full operation and turning out a number of products the Sunnyvale plant of Westinghouse Electric Corp. began receiving visitors with the completion of the first 5,000-kw. steam turbine generating plant for the Mexican government. J. R. McGilvray, plant chief executive, entertained a delegation from Mexico to watch the final tests for the first such unit built in the West. It is the first of 24 now under construction in the Sunnyvale plant and the first of several to be sold to the Mexican government.

From the Comision Federal de Electricidad came Enrico Chicharro, Teodoro Schumacher, Teodoro Alberron Pliego, Leonard Luna and Roberto Ladd, all of Mexico City; Alejandro Paez and Carlos A. Alarcon from Washington, D. C. With them were Enrico Rodriguez Peralta of the E. J. E. Ingenieros, a consulting engineering firm of Mexico City; A. L. de la Torre, manager, and his son Mario de la Torre, engineer, Industrial Electricia de Mexico; and Westinghouse Electric International Company representatives Louis Mascott and Frank Steffey, Mexico City; W. W. Crittenden and R. L. Jeans, New York City; R. H. MacGillivray, San Francisco.

The group and the press were shown the facilities of Westinghouse at Sunnyvale to manufacture motors, transformers, regulators, switchboards, water heaters, as well as steam turbines and other equipment. Charles A. Dostal, Westinghouse vice-president, was host at a buffet luncheon for the group.

● The San Francisco branch of the Foxboro Co., 266 Fremont St., S. F., has acquired the remaining space in the building it occupies, providing almost double the working space previously available. The San Francisco branch of the company is a sales office and warehouse for Foxboro products and also a branch factory, providing repair service on the West Coast.

● Cutler-Hammer Inc., electrical manufacturers, Milwaukee, Wis., has acquired the business of West Electric Products Co., 1795 Pasadena Ave., Los Angeles. W. G. Tapping, Cutler-Hammer district sales manager, will be in charge of the new plant, and the present operating personnel of West Electric Products Co. will be retained. The plant will be integrated with the firm's other plants in the manufacture of motor control, panel boards, lifting magnets, and allied electric apparatus. Sale of the firm's products in the Los Angeles area will continue to be handled by the company's sales office, located at 1331 Santa Fe Ave., Los Angeles.

● California Electric Service Stations will enter a new building in Los Angeles in September. New location will be at 832 S. Alvarado St., Los Angeles. The new building has 50-ft. frontage and 160-ft. depth where Keith Chamblin, manager, declares he will have the "finest service station in the U. S." This is the second move to accommodate growth in the Los Angeles station of this company.

● T. O. Gerlishe has set up a consulting electrical engineering practice at his home, 16273 Via Rincon at San Lorenzo. Gerlishe, formerly with Southern California Edison Co., the Kaiser engineering staffs, and more recently with the Oakdale Irrigation District, also served for a period with the State Division of Industrial Safety.

● J. I. Wright has been appointed operations manager of the Afton-Lemp Electric Co., electrical distributors in Boise, Idaho. He was formerly with the Public Service Co. of Colorado and more recently with the Rocky Mountain Electrical League in Denver.

● Bailey Meter Co., Cleveland, has announced the appointment of two new branch office managers. H. T. Sawyer, formerly manager of the company's Seattle office, has been promoted to manager of the Buffalo office. K. E. Atwood has been appointed Seattle office manager, replacing Sawyer.

● Brown Instrument Co. has announced additions in its regional sales and service staffs. Robert Koening has been named service engineer for Denver, Colo. Richard Corbin will handle service and Ralph Imbrogno sales in Los Angeles.

● George D. Maves, formerly regional manager of the Mountain region for the Minneapolis-Honeywell Regulator Co., has been named manager of the Boston branch of the firm. Edwin A. Thompson succeeds Maves as regional manager for the Mountain region which includes Colorado, Utah and parts of Idaho, Nebraska, Wyoming and Nevada.

New CHANCE HOT TAP CLAMPS

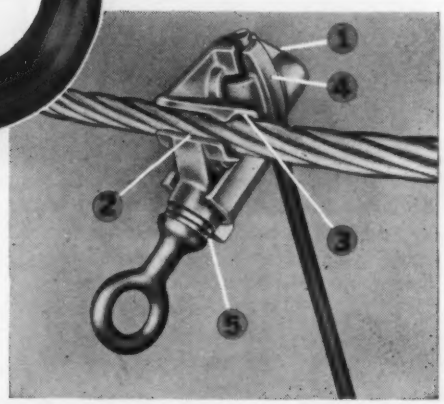
with corrosion-protected thread

Better Contact-- Improved Performance

Chance protected-thread Hot Tap Clamps make better line connections—are easier to install and remove —reduce conductor vibration fatigue—and incorporate the following features that make them the most advanced design on the market:

1. *Top Housing* acts as a protective hood over all working parts and encloses a sealed, waterproof thread chamber containing a corrosion resisting compound. Threads unscrew easily, regardless of atmospheric conditions or length of time the clamp has been in service.
2. *Longer Contact Area* insures better current distribution between strands of 7 strand conductors and provides a superior grip on 3 strand conductors.
3. *Bell Mouth Ends* on main line contact jaws reduce danger of damage to conductor due to line vibration.
4. *Jumper Terminal* is located to counterbalance the eye screw and alleviate torsional stress due to vibration.
5. *Coil Locking Spring* prevents loosening due to vibration —connections stay tight in service.

Diagram showing gradually tapering bell-mouth ends on main line contacts.



These new hot tap clamps are available in three body types: for aluminum or steel connections, for copper connections, or for copper to aluminum or aluminum to copper. Clamps for aluminum or steel conductors have aluminum alloy bodies for best possible corrosion-resistant contacts. Their light weight minimizes vibration and conductor fatigue. Two sizes fit conductors ranging from No. 8 Solid or No. 8 ACSR to 250,000 CM Stranded Copper or 4/0 ACSR or No. 2 ACSR with armor. The two clamps will fit 2/0 Stranded Copper to No. 8 Solid jumper wire. Each size will carry the maximum current allowed for the largest jumper wire without overheating any part of the clamp.

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Battle Creek, Mich.

Sherman
SPLIT BOLT CONNECTORS

ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

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● MULLENBACH ELECTRIC MFG. CO., Los Angeles, is the new name of the firm which was recently changed from a co-partnership to a California corporation. The former partners will retain all outstanding stock in the newly formed corporation. President is Charles F. Mullenbach; vice-president, Paul L. Mullenbach; secretary-treasurer, Robert J. Mullenbach.

● RAYMOND C. BABCOCK of New York City has been named manager of appliance promotion for the Northwest district of Graybar Electric Co., Inc., with offices in Seattle. His new post will cover branches in Tacoma, Portland, Spokane, Butte and Eugene, in addition to Seattle.

● TOM M. HAMILTON'S appointment as manager of the Seattle division for Bendix Home Appliances Inc. has been announced by Lynn Eaton, director of districts. Hamilton will contact Bendix Distributors in Seattle, Spokane, Portland, Denver, Billings and Salt Lake City.

● G. R. DEMENS, former assistant sales manager of The Rittenhouse Co., Honeoye Falls, N. Y., has announced his resignation from that firm to open his own office as manufacturers' agent in Los Angeles, handling housewares and electrical lines. He will be located at 3045 West Ave. 35, Los Angeles 41.

● THE BUSINESS of Coast Engineering Co., Berkeley, has changed its name to Bloxham Engineering Inc., effective July 1. The change in name does not involve any change in policies or personnel, according to the company.

● A. H. CLARKE, chief illuminating engineer for Crouse-Hinds Co., visited the West and held a meeting with district engineers of the Civil Aeronautics Authority to show them new airport lighting equipment.

● COMMERCIAL APPLIANCE CO., Seattle, has been appointed a distributor for Apex Rotarex Corp., Cleveland, Ohio. The Seattle firm handles Apex cleaners, washers, ironers and dishwashers.

● CONSOLIDATION of the Durst Mfg. Co. offices and plant in a new location at 11110¾ Cumpston St., North Hollywood, Calif., has been announced by J. F. Durst.

● APPLIANCE MFG. CO., Alliance, Ohio, has appointed two new distributors on the West Coast: Savage & Sons Inc., Denver; and Kenney Bros., Los Angeles.

● GREGORY ELECTRIC CO., manufacturer of electric transformers, has completed plans to move from Chicago to San Diego. The company has purchased a 62,000-sq. ft plant and is in the process of preparing it for production. Joseph Pass, president of the firm, announced that key men from his Chicago plant have been brought to San Diego. In addition he expects to hire about 350 persons locally after the machinery is set up.

● HEWLETT-PACKARD CO., Palo Alto, manufacturer of precision electronic measuring instruments, has completed construction of new plant facilities in Palo Alto, totaling 20,000 sq. ft. When the new plant is in full operation buildings now occupied by the company will be remodeled for use as research laboratories, mock-up shops and general offices.

DIRECTORY ADDITIONS

DIRECTORY OF MANUFACTURERS

ANCHOR MFG. CO., Boston, Mass.—B. P. Taylor, sales manager; Muth-Richards Co., Seattle; C. E. Klaus, Portland, Ore.; Agencies Co., Los Angeles; Squires & Marshall, San Francisco.

DIELECTRIC MATERIALS CO., Chicago, Ill.—H. D. Isenberg, sales manager; Angus- Campbell, Los Angeles, San Francisco, and Seattle.

CLAUDE S. GORDON CO., Chicago, Ill.—Lloyd J. Bohan, 1680 N. Vine St., Hollywood, Calif.

HOTPOINT INC., Chicago, Ill.—John E. Dugan, sales representative, commercial cooking division, Northwest district; offices at 4505 N.E. Prescott St., Portland 13.

HAMILTON MFG. CO., Two Rivers, Wis.—Pacific Western Equipment Co., Menlo Park, Calif., sales rep. for Hamilton Fluff-Dri clothes dryer on West Coast.

INSULATION & WIRE INC., St. Louis, Mo.—Branch office 1077 Howard St., San Francisco, formerly at 6 Moss St.

NATIONAL ELECTRIC PRODUCTS CORP., Pittsburgh, Pa.—2750 West Lomita Blvd., Torrance, Calif.

SWIVELIER CO. INC., N. Y. City—Northwestern Sales Co., Seattle.

DIRECTORY OF REPRESENTATIVES

HOLLYWOOD: Lloyd J. Bohan, 1680 N. Vine St.

LOS ANGELES: Agencies Co., 125 S. Santa Fe Ave.; Angus-Campbell Inc., 449 S. San Pedro St.

MENLO PARK: Pacific Western Equipment Co.

SAN FRANCISCO: Squires & Marshall, 780 Bryant St.; Angus-Campbell Inc., 241 San Bruno Ave.

PORTLAND: C. E. Klaus, 303 S.W. First Ave.; John E. Dugan, 4505 N.E. Prescott St.

SEATTLE: Angus-Campbell Inc., 1426 Alaskan Way; Muth-Richards Co., 1426 Broadway Ave.; The Northwestern Sales Co., 4130 First Ave. So.

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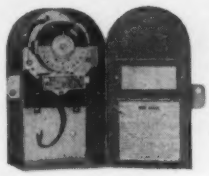

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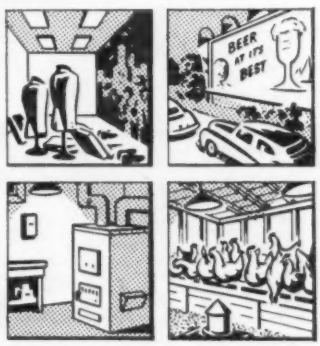

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PROFILES

IES Officers

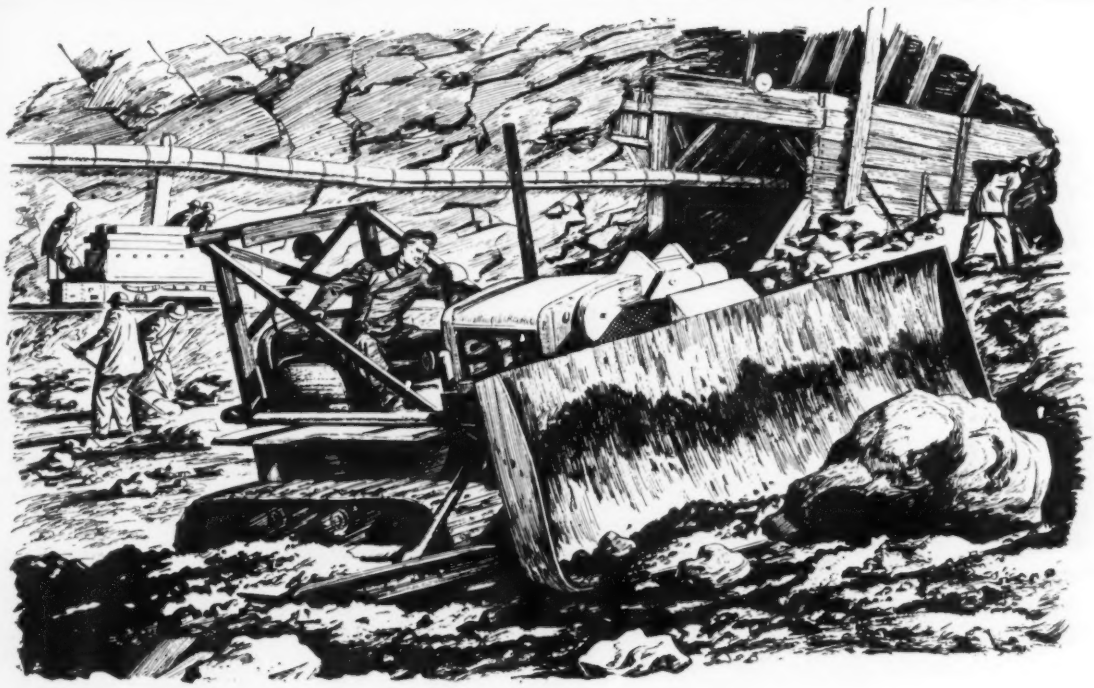
Illuminating Engineering Society Chapters have elected new chairmen and officers recently. At right is Kenneth Hollingsworth, chairman of the Puget Sound Chapter in Seattle, Washington

Pictured below from left are: Don Grandey, retiring chairman Southern California Section, IES, Leonard Towner, new chairman, and Ted Shepherd, new regional vice-president of IES, succeeding Dr. Leland H. Brown of Stanford. Grandey is with Southern California Edison, Towner, G-E, and Shepherd, Dept. of Water & Power

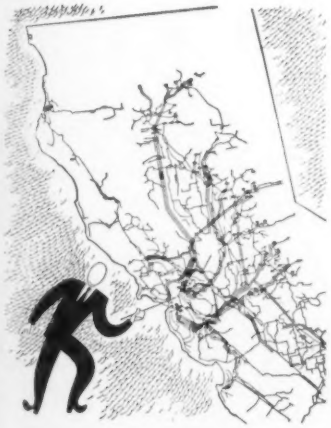
NECA at Santa Cruz

Directors of the Northern California Chapter, National Electrical Contractors Assn., held a quarterly meeting in Santa Cruz recently. Pictured here are: John Brahmst, Niles Electric Co., a director, and president of the Chamber of Commerce; Bill Ochinero, president of the Fresno branch; Bill Bassett, president of the Oakland branch; Tom Robinson, Fresno, veteran director

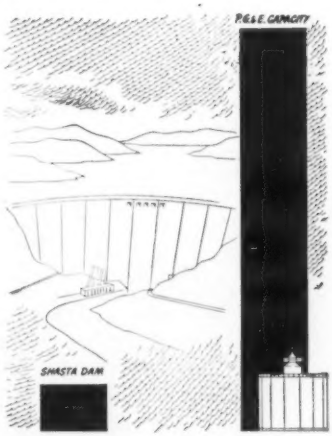
America's biggest power-building program going full speed ahead



Nearly two million new electrical horsepower is on the way for Northern and Central California . . . and the dams, powerhouses and substations needed to turn it out are being built on a 'round the clock, 'round the calendar work schedule. It's the biggest building program of any electric utility in America today—begun just after the war ended—already well along toward its goal! To give you a quick picture, here are some comparisons.



More power is being added than was needed to serve all of Northern and Central California before the war. Construction is speeding along at over $10,000,000 a month.



Added to previous totals, this new power will give P. G. and E. a generating capacity eight times greater than Shasta Dam...three times greater than Hoover Dam.

Thousands of jobs have been created. Today 6,000 men are hard at work building the power needed to serve growing California...to serve you better.

Work never stops on our power-building program

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